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LECTURES  
ON  
THE SURGICAL DISORDERS  
OF THE  
URINARY ORGANS.

BY  
REGINALD HARRISON, F.R.C.S.,  
SURGEON TO ST. PETER'S HOSPITAL.

*THIRD EDITION, RE-WRITTEN AND ENLARGED.*

LONDON :  
J. & A. CHURCHILL,  
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TO MY  
HOUSE SURGEONS AND DRESSERS  
(1868-87)

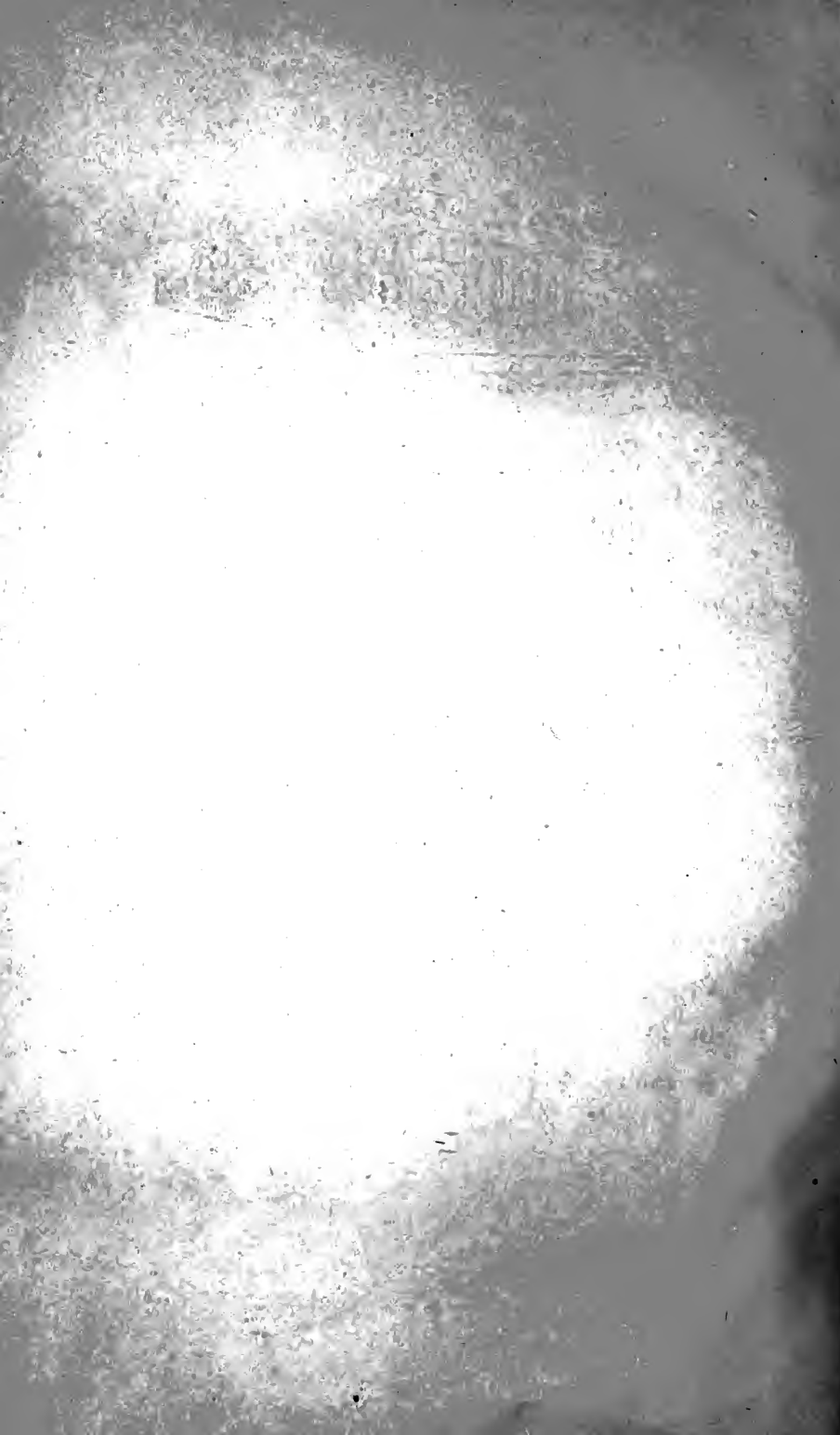
IN THE OLD  
ROYAL INFIRMARY,  
WHO HAVE ASSISTED ME SO LARGELY IN THE  
PREPARATION OF THESE LECTURES,

THIS VOLUME IS

*Inscribed*

BY THEIR SINCERE FRIEND

THE AUTHOR.



## PREFACE TO THE THIRD EDITION.

---

THE Third Edition of these Lectures has not only been entirely re-written, but includes a greater area of practical material than I have previously attempted, with the view of more fully representing the progressive surgical work of the urinary organs.

Further, the volume comprises two smaller ones, which have been out of print for some time, viz.: *The Prevention of Stricture and of Prostatic Obstruction*; and *Observations on Lithotomy and Lithotrity, and the early detection of Stone in the Bladder, with a description of a new method of Tapping the Bladder*.

Many new Plates have been added.

I desire to thank DR. ALEXANDER BARRON for much valuable assistance rendered me in a variety of ways. I would also take this opportunity of expressing my obligations to DR. J. R. L. DIXON and MR. R. J. M. BUCHANAN for enabling me still further to illustrate my remarks.

6 LOWER BERKELEY STREET,  
PORTMAN SQUARE, LONDON.



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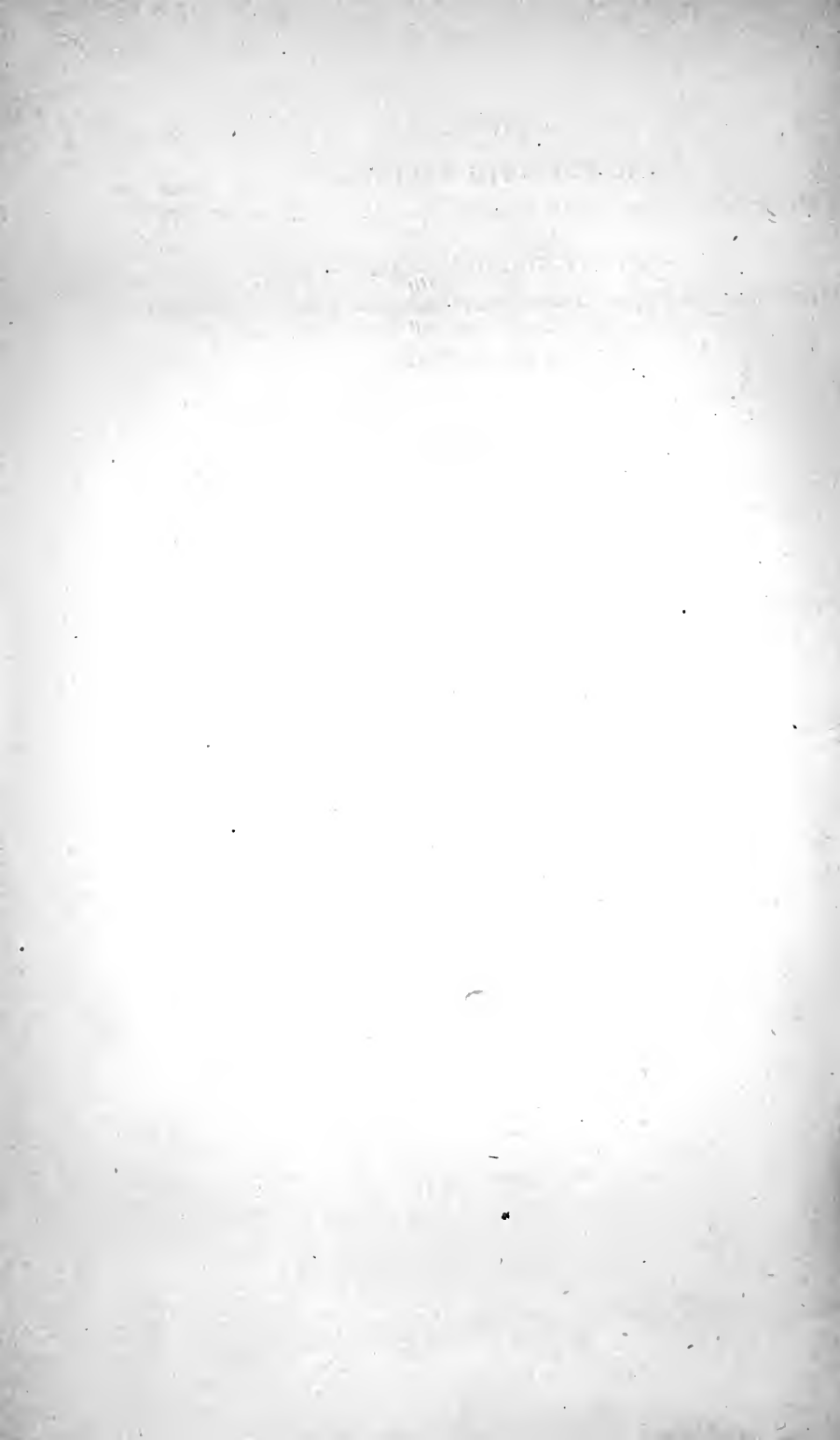
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## FIRST LECTURE.

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PRELIMINARY REMARKS—DEFINITION OF STRICTURE—CAUSES—GLEET—THE USE OF INJECTIONS—POSITION OF STRICTURES—THE ENDOSCOPE—CLASSIFICATION—VARIETIES OF STRICTURE.

GENTLEMEN,—In the course of Lectures that is before us, I purpose, as far as it is practicable, to bring under your notice the more prominent forms of genito-urinary disease. I do not think that it would be possible for you to enjoy more ample opportunities of this special kind than are afforded in the principal hospitals of our seaport towns, where cases are drawn not only from their vast populations, but, I may add, from all parts of the world. Not only shall I thus be able from the abundance of the material at my disposal to conduct my course with more regard to system than is usual with clinical lectures, but you will be able to judge how climate, race, and circumstances modify and alter the course of diseases and injuries as we in this country are in the habit of observing them.

By being able thus to group my subjects, I shall hope to render what I have to say and to demonstrate additionally useful. As the majority of you are now engaged as dressers in the wards, with the view of eventually becoming practitioners of surgery, I cannot lay too much stress on the importance of your taking every legitimate opportunity of practising all manipulations which may be required in the diagnosis and treatment of these diseases. Your future success, so far as this great department of surgery is concerned, is much dependent on the amount of skill and manual dexterity you can acquire.

A man may do more harm with a catheter in a few seconds than will occupy a year for its correction. It is impossible not to recognise the fact that some most valuable operations connected with these diseases have from time to time been brought into disrepute by the unskilful manner in which they have been performed. The manipulative and operative surgery of the urinary organs can only be very imperfectly acquired on the dead subject. The mere act of pushing a metal instrument up a narrow curved membranous tube bears no relation whatever with the delicate manœuvre of passing a catheter on a more or less sensitive man. Of acts such as these, and many others that might be mentioned, the dead body teaches us nothing. You have to practice on the living, and from the living you must learn under the guidance for a time of those who will take care that your education is not obtained by the doing of anything detrimental to the patient. When this supervision is brought to an end by the decision of the examining boards, you will then be thrown on your own resources.

As I purpose devoting the first portion of this course to the discussion of stricture and its treatment, I shall proceed to make some general remarks in reference to this affection.

Associated as I have been for many years with two of the hospitals in this city deriving a large number of their patients from the seafaring population connected with the port, my observation leads me to believe that amongst this class of the community stricture is a common disorder. And that it should be so is not surprising. Gonorrhœa, contracted on shore in the debauch that frequently precedes a vessel's departure for some foreign port, breaks out two or three days afterwards. Treatment, except in ships carrying passengers—and sometimes even in these—is usually conducted by the captain or the mate, and not always, as might be anticipated, with advantage to the patient. The old notion that every disorder consequent on promiscuous intercourse is “venereal,” and must be treated by mercury, still prevails, and large doses of calomel, until profuse

salivation is produced, is not rarely the only remedy administered for a gonorrhœal discharge. Some of the worst cases of stricture I have seen have been occasioned, under similar circumstances, by resort to most primitive means for the relief of retention of urine. In the absence of catheters from the ship's medicine chest, or still more frequently, as I have found, on account of their faultiness, I have known instances where the wire from a soda-water bottle and an iron skewer have each done duty in "forcing" a stricture. A bougie made from an old clock-pendulum was recently shown me by a sailor, as an instrument modelled by himself with which he had successfully combated an obstinate stricture, that had previously resisted the attacks made on it with a gum-elastic catheter. It is not a long time ago that a man was admitted into my ward with retention, and a badly lacerated urethra, as a consequence of an attempt on the part of the mate of his ship to reach the bladder by the aid of a pointed piece of wood, roughly adapted to the shape of a bougie. Here the operator was more than professionally interested, inasmuch as he had occasioned the retention by kicking the patient behind the scrotum. The most remarkable piece of ingenuity of the kind that I can remember was where, after a patient had endured the unspeakable agonies of retention for over three days, an endeavour had been made to introduce through the urethra a piece of gas-piping, which had been devised, *in extremis*, for the purpose by the engineer of the ship. Unfortunately, however, this failed to effect its object. When I saw him, immediately on his arrival, the urethra was found much lacerated, and it was with considerable difficulty that I introduced a catheter, and removed a large quantity of the most fetid urine imaginable. Relief, however, came too late, the man dying shortly after his arrival, with convulsions and urinary poisoning. Though deploring that persons should by circumstances be placed in such unfortunate positions, I allude to these cases for the purpose of showing you that your field for observation here, in this department of surgery alone, is by no

means restricted to what I may call routine, or even to the freaks of nature or the ravages of disease.

In undertaking to speak about the treatment of stricture, I am conscious that the subject is a well-worn one. Still with all our plans of treatment, we have not arrived at anything like uniformity in practice; and as this is only to be attained by taking the sum of our respective experiences, I feel less hesitation in bringing under your notice some conclusions which I have been enabled to gather from both public and private sources.

I restrict the term stricture to one kind, namely, organic, where there is a physical alteration in the walls of the canal, rendering it incapable of natural distension or contraction. "Spasm" and "inflammation" are conditions which may be superadded, but they do not constitute stricture in the acceptance of the term now generally adopted. The causes of stricture are various. The greater proportion of patients attribute their misfortune, directly or indirectly, to previous attacks of gonorrhœa. Those who do so *directly* are disposed to regard the stricture as the natural consequence of their previous mishap. Those who do so *indirectly*, usually have something to say about the treatment employed and its bearing upon the subsequent formation of a stricture. It is worth our while, for a moment, to analyse the statements made by this latter class, with the view of ascertaining how far their allegations hold good. "I was almost cured of my gonorrhœa, only a very slight discharge remaining, which I thought would go away of itself," is the statement of the patient who is convicted of his own indiscretion in having allowed things to go on from bad to worse. Others, again, seek refuge in referring their misfortune to the improper advice they have received. "I was told that it was only a gleet, due to weakness, which would go away by iron, tonics, and cold baths." Here we have illustrations of gleet terminating in stricture.

Now, it is well for you, once for all, to understand that a

gleet is not a disorder which is disposed to go away of itself; on the contrary, it requires careful and well-considered treatment; and if it does not receive this—that is to say, if it is clumsily dealt with, or not dealt with at all—it most probably ends in the formation of a stricture.

A gleet\* is to be regarded as indicative of the early formation of stricture. Nay, further, you will not do wrongly in regarding a gleet as the stage in the stricture-forming process when, by your treatment, you can promise your patient to restore his urethra to its normal condition. When a stricture is once allowed to become cicatricial in its character, you may palliate or adapt, but you can no more *restore* his urethra than you can, by dissection or any other process, remove a scar from his skin. You may lessen the inconveniences of a scar, but you cannot obliterate it. Let not, then, the curable stage of stricture pass by; at all events, let the onus of doing so rest with your patient, and not with yourself.

Again, it is very common to hear patients attribute their strictures to the use of injections in the treatment of their gonorrhœas. A considerable amount of prejudice exists in the public mind in reference to the use of these applications. Patients not unfrequently say, when consulting you about a gonorrhœa, “Do not order me an injection, as I understand these remedies often occasion stricture.” Is there any truth in such an allegation? Assuredly not, presuming, of course, injections are judiciously prescribed and properly used.

Let me remind you that the cure of gonorrhœa by specifics is essentially one on the principle of injection. For how do the drugs that act specifically on the urethra effect their purpose? How do we explain the action of copaiba, oil of sandal-wood, creasote, and certain terebinthinates, in the cure of gonorrhœa? Do not all these drugs exercise their therapeutic virtues by certain of their constituents, for the most part demonstrable, being conveyed by the urine to the site of the disorder? What is

\* Called by the French, *Goutte militaire*; by the Germans, *Nach-tripper*.

this but a cure by injection, or, to be etymologically correct, ejection? It is the urine of the patient that conveys the specific to the disease, just as the rose-water in your injection does the sulphate of zinc, or other astringent.\*

It is the abuse of injecting that is open to animadversion. Injections, in the treatment of gonorrhœa, do harm only when, by reason of their composition or strength, they act as irritants to the mucous membrane and cause pain.

In the ordering of urethral injections, there are two rules which should be followed:—1. Do not strain the urethra by the *quantity* of injection used. 2. Do not pain the urethra by the *quality* of the injection. A teaspoonful of fluid *put* into the urethra frequently is better than a tablespoonful *forced* in three times a day. This is a point upon which I have long insisted. In reference to this subject, I would desire to endorse the following passage:—"I cannot refrain here from making an observation about injections in the urethra. The remark is frequently made that they sometimes produce orchitis. It may be that some injections do so through their caustic and irritating nature, but, in the greatest number of cases, I convinced myself that the injection pushed with great force into the urethra acts quite mechanically, like a large bougie, and this violent mechanical dilatation by the liquid produces

\* Somewhat similar results appear to follow inhalation. Taking the idea from Professor Dittel's paper on the benefit obtained in cases of pyelitis and catarrh of the kidney-tubes by inhaling certain essential oils, Zeissl tried it in purulent urethritis. The case selected was a male with a copious discharge, and he was caused to inhale the vapour of rectified oil of turpentine, morning and evening, for a quarter of an hour at a time. On the second day the urine betrayed the odour which is likened to the smell of violets, and is usual in that secreted by patients taking the oleo-resins. The inhalations caused no inconvenience, and were steadily continued for twenty-five days, at the end of which time the pus had entirely disappeared from the urine. The experiment was repeated in a second case, with like results.—*London Medical Record*, vol. i., p. 361.

A curious effect of what I believe to have been due to inhalation was brought before the notice of the Medical Institution, in 1866, by the late Mr. T. Shadford Walker. The whole crew of a ship, carrying a cargo of turpentine, had suffered during the voyage from hæmaturia; in one case with a fatal result.

orchitis. Since I came to this practical conclusion, I have recommended my patients to use injections very gently, and since then I have not seen any cases of orchitis occur. This observation is applicable to any kind of injection, and I have seen orchitis take place even in cases where only tepid or cold water has been thrown with force into the urethra, and such an occurrence will happen, principally in persons of irritable constitutions.”\*

In prescribing injections you should feel your way, adding to their strength according to circumstances. Some persons, it is well known, are far more sensitive to the action of remedies than others; and this applies equally to the urethra—“The temper of the urethra varies as much as the temper of the mind.”† An injection appropriate in strength for one person is not necessarily applicable to another. I remember ordering a chronic patient an injection, well known as “the four sulphates.” It cured him effectually, and without pain. A friend, hearing of the success, borrowed the prescription, and, without proper advice, used it. The consequences were, an acute attack of cystitis, and a subsequent stricture. Surely, it is only to the foolhardiness of the sufferer that such an unfortunate result is to be attributed.

As indicating that strictures occur with great frequency in persons who have been treated for gonorrhœa without local application, Sir Everard Home observed:—“Three-fourths of the native East Indians of rank are troubled with stricture, which is entirely attributed to the effect of gonorrhœa, for the cure of which no local applications are in use.”‡

And I would here remark, that I have seen a great deal of damage done, and suffering occasioned, by the use of some of the nostrum injections advertised throughout the country as “infallible cures” and “preventives.” Many of them contain

\* Dick, *On the Pathology of Gleet*, 1858.

† Brodie, *On Diseases of the Urinary Organs*, p. 50.

‡ *Stricture of the Urethra*, 3rd edition, p. 34.

the ordinary astringents applicable to the urethra, but in a very potent form. I caution you therefore against sanctioning their use.

These observations have been made with the view of showing that it is only by their improper use that injections are open to the charge of occasioning stricture. If they are prescribed in accordance with the rules I have given, you will never have cause to regret their employment.

Then, again, we have strictures resulting from the healing of sores, of wounds, and of lacerations of the urethra; in the last-named we include what are described as traumatic strictures. Let me take a few illustrations. A patient has a sore on his glans penis, involving the meatus. When the sore heals a cicatrix is left. All scars or cicatrices are prone to contract, and thus cause a narrowing of the urethral orifice. This condition was well illustrated in a patient where the same state of things was brought about by an improperly performed operation of circumcision, a portion of the glans penis having been removed as well as the prepuce. When the sore healed, the cicatrix contracted, and the patient presented himself here with a tight stricture of the meatus requiring division. Blows on the perinæum are a frequent cause of stricture amongst our sailor population. A man falls from aloft, across a spar or a rope, and ruptures his urethra. If the patient recover from the immediate effects of the injury, it is with his urethra scarred. This is the worst variety of stricture—traumatic—a form of the disorder more obstinate to deal with than any other. Traumatic stricture may be caused by violence from within, as in crushing of the pelvis, when the fractured pubic bone pierces or lacerates the urethra. Here we have, for the most part, jagged and uneven wounds, not rarely complicated with extravasation of urine—a condition of things unfavourable to accurate or kindly repair. Injuries occasioned in this way are invariably followed by a dense stricture, and in this respect are a contrast to the clean-cut wounds of lithotomy, where the occurrence of stricture

is exceedingly rare. This observation has an important practical bearing, and will again be alluded to in considering the treatment of injuries to the urethra.

I need not give further illustrations of the causes of stricture. Anything that is capable of structurally altering the wall of the urethra, by scarring it, as in wounds, however inflicted, or indurating it, as by the persistence of inflammatory action, is liable to be followed by a stricture; and any portion of the urethra (excepting the prostatic, which has its own peculiar obstruction,) may be so strictured.

The greater proportion of strictures occur at the sub-pubic curvature of the urethra; here for their detection and treatment we are dependent upon various kinds of instruments known as bougies; consequently it is of the first importance that we should accustom ourselves to their use, in order that we may diagnose correctly and treat skilfully.

Various explanations have been offered of the frequency of stricture in the position referred to. It is quite obvious why traumatic stricture should most frequently occur here, as the urethra is violently dragged, by the force applied, from where it is fixed by its connection with the triangular ligament. It is at first sight less obvious in reference to stricture resulting from chronic urethritis. I think the explanation offered by Mr. A. P. Gould is probably the correct one.\* By reference to the diagram accompanying Mr. Gould's paper, it will be seen that the portion of the urethra which is more frequently strictured than any other is horizontal, and here it is that morbid secretions are apt to collect and to cause a sufficient amount of inflammatory action to lead to plastic exudation within and around the walls of the urethra. I believe that this is the correct explanation of a generally admitted fact; it is also suggestive as to what may be done in cases such as these to prevent the formation of stricture. For some time past I have

\* "Why is Organic Stricture most common in the Bulbous Portion of the Urethra?" By A. Pierce Gould. *Lancet*, Dec. 8, 1877.

been employing, in the treatment of obstinate gleet discharges, the thorough irrigation of the deeper portion of the urethra, by means of a soft catheter and slightly astringent solutions, with most satisfactory results. Sufficient importance is not, I believe, attached to the thorough irrigation of the bulbous

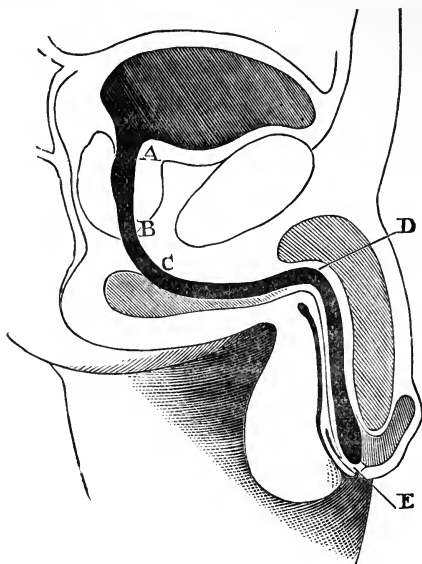


Fig. 1.

- A—C. Prostatic and Membranous Urethra.  
 C—D. Bulbous do.  
 D—E. Penile Urethra.

portion of the urethra in the treatment of gleet. The fact that this locality is by far the most frequent position of stricture; that stricture is almost always preceded by gleet; and that the ordinary mode of using injections, as practised for the treatment of gonorrhœa, is utterly valueless in gleet; all point to a conclusion which experience justifies, that to cure a gleet and prevent a stricture, the part affected must be completely brought under the influence of medication. This can only be efficiently done by the use of a suitable urethral *douche*, by means of which the urethra may be thoroughly cleansed from one end to

the other twice a day, or oftener if necessary, employing for this purpose as a lotion several ounces of tepid water, containing some sulpho-carbolate of zinc or other similar agent. I have found the practice followed by much success.\* A solution of corrosive sublimate (1 in 20,000) will often be found useful and quite strong enough.

The apparatus† I make use of is shown in the following sketch :—

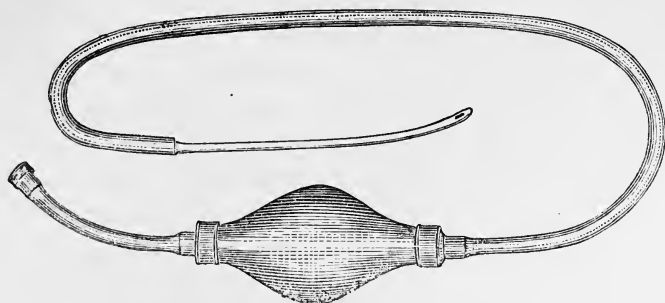


Fig. 2.

It consists of a small Higginson's syringe, upon which is fitted an india-rubber catheter. By means of this appliance the patient is directed to *douche* his urethra, not using, as with the ordinary glass syringe, about a teaspoonful of fluid, but half a pint of the necessary astringent. In old cases of gleet, where there is a granular bulb, the conventional mode of injecting with the glass syringe is of about as much service as a gargle is to the ulcerated throat of a patient who contents himself with taking half a wine-glassful of the fluid into his month and then spitting it out, and repeating the performance twice daily.

Mr. Walter Whitehead has introduced a soft rubber catheter, with a deep spiral groove from tip to base on the outer surface, for a similar purpose.

Less frequently, we find strictures occurring at the meatus of the urethra, and within two and a half inches of it; these are

\* *Lancet*, May 15th, 1880.

† It can be procured from Messrs. Symes, Hardman Street, Liverpool.

generally occasioned by the puckering resulting from the healing of venereal sores. You will remember the very marked illustration of this variety which we had recently, where the last inch of the urethra was strictured by a mass of cicatricial material, which had resulted from the filling up of an extensive phagedænic sore.

It will be proper, here, to remind you that, for the exploration of the urethra, a special speculum, or, as it is called, an endoscope, has been devised. The most improved instrument is Desormeaux's, as modified by Dr. Cruise, of Dublin, where a strong artificial light is reflected along a urethral speculum. A tolerably extended use of this instrument has convinced me that its utility is limited to certain cases of granular urethritis, which resist the ordinary methods of applying topical agents.\* In the diagnosis and treatment of stricture, it furnishes little or no assistance.

The galvanic light has been used for this purpose, but so far the results do not appear to me to be any more encouraging than those arrived at by the ordinary endoscope. For examining the last two or three inches of the urethra, I have sometimes found Dr. G. K. Smith's simple urethroscope, with a reflector, of service.

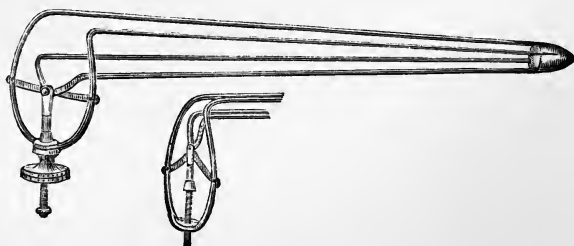


Fig. 3.

There are two forms of stricture, the mucous and sub-mucous, which, though often concurrent, yet generally have an

\* "The Endoscope in Diseases of the Urethra and Rectum," by Reginald Harrison.—*British Medical Journal*, 1868.

independent existence; and as, bearing upon the subject of treatment, their recognition is of importance, I refer to them here.

By the mucous stricture we understand that form of the affection in which the impediment is limited to the lining membrane of the urethra. This impediment consists, for the most part, of the puckerings caused by the healing of ulcers—the caruncles of the old writers,—and adhesions of the membrane forming those obstacles which have received the name of valves or bridles.

In the sub-mucous variety, the obstruction is in the tissues outside the mucous membrane. So structurally unimplicated may this membrane be, that, on its removal from the indurated tissue beneath, it is found unaltered in its dimensions. This I have verified after death, by dissection. During life, this position of the stricture explains the success that follows divulsion in certain cases, the effect of such an operation being to break up the stricture without any further damage to the mucous membrane than that of stretching it to its original dimensions.\*

The precise mode in which a stricture is formed may here be noted. That the stricture is not, as a rule, due to ulceration of the mucous membrane of the urethra, and the subsequent contraction of the cicatrix is at once obvious. A persistent inflammation of the urethra eventually leads to structural alterations taking place in the canal, which seriously impair its power of conducting urine without leakage of some of the constituents of the urine, at certain points where these changes have taken place. I believe these changes are, in the first instance,

\* Benjamin Bell, in his work on Gonorrhœa, published in 1793, recognised the distinction. "In the more fixed kinds of obstruction proceeding from gonorrhœa, the diameter of the urethra is lessened in two different ways. For the most part, it is diminished by a thickening taking place at some particular point in the membrane of the passage itself. . . . At other times the urethra is drawn together, or contracted as if a cord were tied round it, without any disease being perceptible."

entirely confined to the destruction of the epithelium at the points already indicated. In this way urine penetrates the walls of the canal, and barriers of lymph are thrown out as a consequence of the irritation that is provoked, principally around the walls of the canal. This is the common way in which stricture tissue is formed.

It is by such a theory that we can alone explain those cases of multiple stricture which are sometimes met with. I have recently seen a case of a young soldier, whose urethra was almost entirely strictured throughout by a series of nodular points, chiefly in relation with the floor of the urethra, which could only be explained on the supposition that the urethra had almost entirely lost its normal power of conducting urine in the course of a long gleet, and that these numerous points of induration and contraction marked the spots where leakage of some of the constituents of the excretion had been permitted to take place. Though some of the elements of the urine may in this way soak through and cause irritation around the canal, this need not necessarily amount to that degree of tissue destruction which follows the extravasation of urine as we usually see it. I shall shew that urine when deprived of its urea may become extravasated with impunity, and that under these circumstances its penetration amongst the tissues surrounding the urethra may merely prove a source of irritation sufficient to provoke what I would speak of as a compensating lymph effusion. Thus, by an encasing splint of exudation-material, which subsequently becomes organized and contractile, does nature repair a leaking urethra.

The following classification of strictures (after Dittel) \* may be found useful for reference. In this are included strictures due to new growth, excluding heteroplastic growths, such as malignant and other tumours pressing upon the canal, the new growth being connective tissue, which always has a tendency to contract when not adequately resisted.

\* *Die Stricturen der Harnrohre*, von Professor Dr. Leopold Dittel.

First.—Free (inside the canal), including warts, valves, and bridles.

Second.—In the walls, including traumatic and ulcer cicatrices.

Third.—Outside and around the mucous membrane, including peri-urethral callus, as—ring stricture (short); nodular stricture; diffuse stricture.

It not unfrequently happens that the urethra is strictured at more than one point. Hunter gives an instance where a urethra contained six strictures; and even more than these have been found by Lallemand and other French writers. You will, however, seldom meet with instances where the number of strictures exceeds three; two are not uncommon. Where there are multiple strictures, and the anterior one is exceedingly tight, the difficulty of passing those beyond is much increased, inasmuch as the free manipulation of the bougie is interfered with by the tightness with which it is grasped by the anterior obstruction. In such instances it is often necessary to deal with the anterior stricture independently, either by dilatation or incision, until it is sufficiently relaxed to allow of the instrument being passed with freedom on to the face of the deeper obstruction. You have had many illustrations of the advantages to be derived in multiple stricture from this plan of proceeding.

It must be remembered, especially in connection with the introduction of instruments, that the course of the urethra is often deviated by reason of the cicatricial material constituting the stricture being irregularly deposited. Hence we have what are called concentric and excentric strictures. In the former the passage, though contracted, still remains central; whilst in the latter, which includes the large majority of strictures, the canal is pushed to one side, and thus rendered not only more or less impervious, but also tortuous.

I frequently demonstrate this when using the fine whalebone bougies in cases of advanced stricture. In passing them, if I

find any hitch to their progress when the stricture is reached, I withdraw them and bend their tips to an angle, as represented in the accompanying sketch:—



Fig. 4.

On re-introducing them, and giving them a spiral or corkscrew movement on approaching the stricture, I then usually find no difficulty in carrying them on into the bladder, the explanation being, that the axis of the canal is not central. You have, in fact, to seek the opening through the stricture in a corner or angle of the canal, and not, as we generally expect to find it, in the middle. The small gum-elastic filiform bougies adapt themselves to this condition of things, and hence have an advantage over the unyielding metallic instruments. Ignorance of this in using metallic instruments frequently leads, I believe, to the formation of false passages, force being substituted for the *tactus eruditus* which is alone necessary. Benjamin Bell, and, more recently, Leroy d'Etoilles and Gouley, of New York, have all in their writings insisted upon the due recognition of this very important practical point.

Just as there are differences in the form and position of strictures, so are there differences in what I may call their temper. One is indolent whilst another is irritable; a third is contractile, and a fourth hæmorrhagic. I mention them now to prevent repetition when I come to speak of treatment, and for the purpose of reminding you at once that much discrimination and experience are required, not only in the carrying out, but still more in the selection, of the means appropriate to each case.

The irritable stricture, as the name implies, is more or less intolerant of all instrumental interference, such as the passing of bougies or of catheters. It is usually accompanied with muscular spasm, which adds considerably to the distress of the

patient. Hence this stricture is not amenable to treatment by gradual dilatation, as each passing of an instrument is commonly attended by some urethral distress, such as retention, the discharge of blood, or a rigor, followed by varying degrees of febrile excitement. These strictures are best met by some proceeding in which, under an anæsthetic, the contracted part is at once brought up to the normal calibre of the urethra; of these, as I shall subsequently state, rapid divulsion is perhaps the best; at all events, I have found it so; and if in these irritable strictures, intolerant of the prolonged presence or otherwise of an instrument in the urethra, I employ dilatation, it is merely for the purpose of bringing the contracted urethra to a size capable of receiving a dilator which such an operation requires. These cases are not suitable, as a rule, for internal urethrotomy alone, as they will be found to furnish the instances where such a proceeding has been followed by a fatal result. The conditions under which internal urethrotomy may here be performed will be referred to in a future lecture.

The contractile stricture is one that you can dilate, but it does not retain, even for twenty-four hours, any of the additional calibre you may have given it by the gradual introduction of bougies in successive sizes. It simply speedily falls back to its original narrowed dimensions. These are the strictures which are generally benefited by section—that is to say, by external or internal urethrotomy. This form of stricture has been described with singular accuracy and clinical precision by the late Professor Syme, who, by the operation he perfected, brought it within the range, if not always of cure, at all events of such an amount of relief as to render it readily manageable.

The terms “indolent” and “hæmorrhagic” strictures will not require any further comment here.

## SECOND LECTURE.

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THE SURGICAL ANATOMY OF THE URETHRA—SPASM—THE  
 DIMENSIONS OF THE URETHRA—OTIS'S VIEWS—THE  
 CURVATURE OF THE URETHRA—THE RELATION OF THE  
 URETHRA TO THE RECTUM—ATTACHMENTS OF FASCIE—  
 OPENING OF THE SEMINAL DUCTS.

I SHALL ask your attention on this occasion to certain points respecting the structure, dimensions, and anatomical relations of the urethra. Some persons, it would appear, seem to think that anatomical knowledge affords but little help in this department of surgery. Now, I dare say, many of you learnt to pass a catheter with tolerable dexterity before you knew anything from dissection of the anatomy of the parts operated upon; and so, perhaps, you might continue to do, but the occasion will come when you will find yourselves entirely at a loss, and unable to give your patient that assistance which you might otherwise have done.

I could give you numerous illustrations in point, but this is unnecessary, as I take it to be the duty of every person who intends to practise surgery to make himself acquainted with the anatomy of the human body, without excepting any portion of it.\*

Nor is it my intention to give you an anatomical description

\* It is curious to notice how ignorance of anatomy has at times seemed to serve somewhat advantageously the legitimate purposes of surgery. Erichsen has observed,\* "The lithotomists of the sixteenth and seventeenth centuries cut successfully for stone till they were taught anatomy, and then a recognition of the dangers attendant on the operation shook their nerves, and they lost their skill." Where ignorance was bliss, it was then folly to be wise.

\* *Address on the Tendency of Modern Surgery.* British Medical Association, 1886.

of the urethra ; I shall presume that you are familiar with the anatomy of this canal ; if you are not, I shall refer you to the various treatises on the subject.

My object here is to point out in what directions your anatomical knowledge may be of service to you, and where you may expect to derive assistance from it in the practice of surgery as applied to diseases of the urinary organs.

The urethra is made up of various structures, possessing different properties, and arranged in layers—viz., internally mucous membrane, then involuntary muscular fibre, disposed longitudinally and circularly, and lastly, erectile tissue, which everywhere surrounds it. Further than this, it must be remembered that in its deeper portion the urethra is embedded in voluntary muscular fibres, which are capable of exercising a compressing force upon its walls, sufficient under the excitement of various stimuli, at all events, to prevent the expulsion of urine from the bladder. Such an impediment is known as spasmodic stricture. Uncomplicated with organic stricture, it is exceedingly rare. It is usually provoked by some active inflammation of the urethra, such as a gonorrhœa, or by the irritating influence of disordered urine ; but when uncomplicated with organic stricture, it can never be regarded as affording a serious obstacle to the passage of an instrument into the bladder. Though this condition, when circumstances permit of it, may be successfully combated by rest, warmth and opiates, and such other measures as are calculated to remove muscular rigidity, where retention of urine exists, catheterism should be at once practised.\*

\* Guthrie enforces this so characteristically that I will repeat his own words. In relating such a case, he remarks:—"I was taught better many years ago by a Scotch friend, a young man, though an old soldier, who, after a debauch of this kind, which lasted half the night, found he could not make water when he awoke in the morning from his feverish dreams. He sent for me, begging I would bring a catheter with me. When I arrived I proposed an opiate ; His answer was peremptory enough, "D— your draughts, doctor, pass the catheter ; I have had it before." As remonstrance was useless, I passed the instrument and drew off his water, upon which he jumped into bed, saying,

In one instance that has come under my notice, in an eminent member of our profession, the rigidity of the muscles of the perinæum was so unusually great, and the distress on proceeding to pass a catheter so extreme, that I deemed it desirable to place the patient under chloroform. When this was done, a full-sized catheter passed readily into the bladder. On several subsequent occasions a similar course has been followed.

In a case of acute spasmodic asthma in a gentleman I saw, in consultation with Dr. Glynn, there was extreme difficulty and spasm in micturating. This, in the absence of any sign of organised stricture, was, I presume, another phase of the asthmatic condition.

I have already referred to the function of the epithelial lining of the urethra in preventing urine leakage, and to its destruction by chronic inflammation, as being a common cause of organic stricture.

In reference to the muscular surroundings of the urethra, it should be remembered that it is the occurrence of spasm which determines retention. There can be no such thing as an impermeable urethra, except in connection with a urinary fistula. So long as the kidneys go on excreting urine, so long, unless a disturbance of muscular action takes place, will urine continue to find its way through the most contracted urethra.

Every person who suffers from stricture finds out from experience the maximum quantity of urine over which he can successfully exercise propulsive power; and so long as this quantity is not exceeded, the ability to expel urine remains, although the stream may be exceedingly small, or even issue in drops. Should, however, from any cause, urine be allowed to collect in the bladder beyond the accustomed limit, the propul-

"God bless you, doctor, but d— your physic." Since that time I have always made it a rule to try and pass a catheter in every case of retention of urine. If it passes, so much the better; if it does not, the patient submits more cheerfully to the longer course of treatment."—Guthrie, *On Diseases of the Bladder*, p. 89. 1834.

sive apparatus becomes disarranged by being called upon to do unaccustomed work, and irregular spasmodic efforts take the place of that combined muscular action necessary in the case of a person who at the best of times voids his urine under difficulties.\* This consideration is offered as explaining how retention may be regarded as an accident occurring in the course of a stricture case, and how it is spasm becomes super-added to permanent urethral obstruction.

That a plug of mucus within a stricture is often the determining cause of retention, there can be no doubt. Proof of this will be found in the fact that the passing of a fine filiform or whip bougie, and its immediate withdrawal, will frequently enable the patient to pass water.

The view that organic stricture within the penile portion of the urethra is occasionally the excitant of spasm in the deeper portion, and that the latter is curable by removing the former by urethrotomy, has recently had some prominence given to it in a discussion between Dr. Otis and Dr. Sands, of New York.† That a permanent obstruction in one part may disturb the muscular action of another is what might be expected in a system where the proper performance of function is dependent upon a normal condition and mutual relationship of the whole. I cannot, however, say that I ever met with a case where the spasm so produced was sufficient seriously to oppose the introduction of an instrument along the urethra after the organic penile stricture had been passed.

Mr. Annandale‡ has pointed out the frequent occurrence of

\* "How frequently we see a spasmodic condition of the urethra supervening upon old organic stricture, and causing retention of urine. No doubt it depends upon irritation, beginning with the urethra behind the stricture, which exerts its influence, first upon the nerves of sensation, and thence upon the muscles of the urethra, through the excito-motor function of the spinal marrow. Large doses of opium relax this muscular spasm, and the patient is able to micturate."—Hilton, *On the Therapeutic Influence of Rest*, p. 250.

† *Hospital Gazette*, U. S. A., April, 1879.

‡ *Liverpool Med. Chir. Journal*, vol. i, p. 10.

spasm of the œsophagus at one point when the seat of real stricture is at another.

The mucous lining of the urethra has depressions in it which in the natural state cannot be regarded as affording any serious obstacle to the passage of one of the larger sized catheters. In cases of stricture, these lacunæ, behind the obstruction, become largely dilated, and are apt then to catch the end of the instrument after it has been passed through the stricture. Again, these dilated lacunæ may afford receptacles for urine, which, becoming decomposed, sets up inflammation within and around the urethra.

The respective dimensions of the urethra are best understood by reference to casts, such as are pictured in Sir Everard Home's work on stricture (Fig. 5).

The erectile tissue, which everywhere surrounds the urethra, is not unfrequently the source of the hæmorrhage which

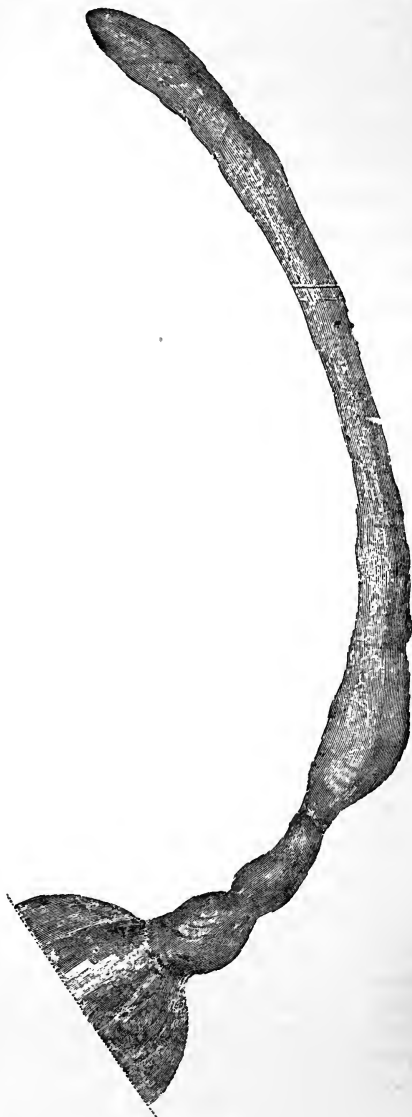


Fig. 5.

follows where false passages have been made. The hæmorrhage under these circumstances rarely proves very considerable or persistent.

Dr. F. N. Otis, of New York, in a recent work on the treatment of stricture, advances the proposition that every urethra has an *individuality*, and that no *average standard* is of use in examining a given urethra. This he demonstrates by the use of a very ingenious instrument, called a urethro-metre, consisting of a straight tube, the end of which can be made into a kind of fenestrated sphere, the latter corresponding to a dial-plate at the handle, which marks the size of the sphere. By this means, the normal calibre of the urethra can be accurately measured, as also the circumference of the stricture.\*

To give an example: when the circumference of the penis was three inches, the calibre of the canal was found to be 30 m. of the French scale; when it was  $3\frac{1}{4}$  inches, it would be 32 m., and so on in proportion.

Upon these views as to the measurement of the urethra, Dr. Otis bases a method of treatment which will be referred to again when I come to treat of the various plans of practising urethrotomy.

If we refer to a side view of the pelvic organs, we can advantageously study the relations of the urethra to the surrounding parts (Fig. 6, from Gray's *Anatomy*). The curves of the urethra should here be noticed, with the view of determining the best position of the parts for the introduction of instruments along the canal. If the operator were to attempt to pass a catheter with the penis in a pendent position, it is quite evident that he would have to encounter two curves, a difficulty which in the case of a rigid instrument would be found insurmountable; whilst, on the other hand, the position of the penis may be so varied during the operation as entirely to do away with one curve, and materially diminish the resistance of the other.

\* *British Medical Journal*, Feb. 26th, 1876.

It may be here observed that the urethra is only rigidly fixed at one part of its course—viz., as it passes through the triangular ligament. In front of this, it is sufficiently movable to permit of the whole of the canal being brought upon the same plane as the membranous portion which is contained between the two layers of the triangular ligament. Hence a straight instrument, such as the staff used by Key for

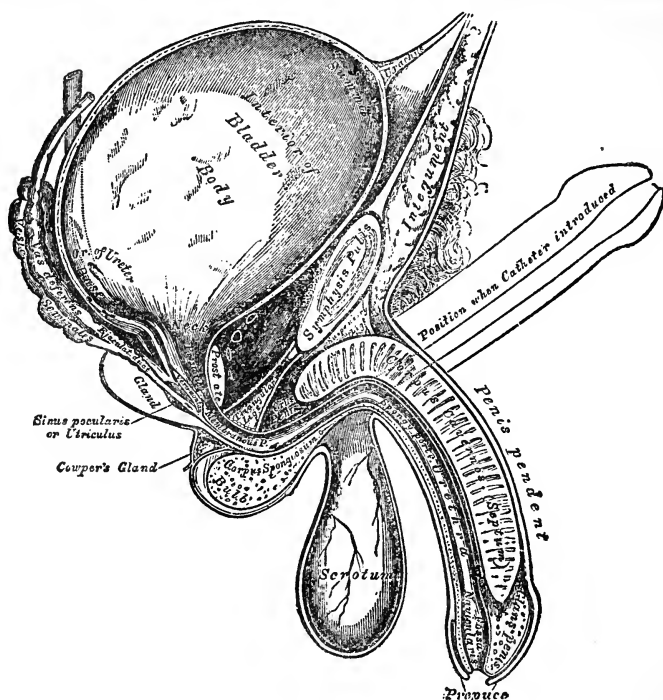


Fig. 6.

lithotomy, may be introduced into the bladder quite as readily as an ordinary curved catheter.—

It should be remembered that it is at the point where the urethra goes through the triangular ligament the inexperienced operator meets with his greatest difficulty in passing a catheter, the point of the instrument being usually allowed to drop so as to press against the ligament *below* the urethral aperture.

After noticing its curvatures, we should next trace the urethra in its course to the bladder.

The first portion of the passage is subcutaneous, being situated along the under surface of the penis. Here it can be manipulated externally by the fingers, and direct assistance in this way rendered in the piloting of bougies through tight or tortuous strictures. In the case of strictures in this portion, their division by external or internal urethrotomy is accomplished without difficulty, by reason of the facility with which the urethra can here be handled. As the urethra passes behind the scrotum, it consequently becomes more deeply situated, and less accessible to external manipulation; whilst further again, in the perinæum, and behind the triangular ligament, little impression can be made upon it from without. If, however, you will refer again to the side view of the urethra, you will see that even here it is not beyond the reach and control of the finger.

On introducing a bougie into the bladder, and the index finger into the rectum, the line of the urethra for an inch and a half of its course can be distinctly made out, and the position of the instrument determined. Now, when we consider that the great majority of strictures are situated in this portion of the urethra, this is a piece of anatomical knowledge worth remembering. Fewer false passages would be made in difficult cases of catheterism if we bore in mind that we had the means of testing in the deep portion of the urethra the course the instrument was taking, and of rendering assistance to the passage of the instrument through the stricture by the introduction of the finger into the rectum.

To proceed. If the finger is carried still further, the line of the prostate can be distinctly made out, and any alteration in its size or consistence noted.

In difficult catheterism arising from prostatic enlargement, assistance may often be rendered in "tilting" the instrument into the bladder by the finger in the rectum. Further than

this, where, by reason of the enlargement of the middle lobe, there is much resistance to the entrance of the catheter into the bladder, by placing the finger as a support to the prostate, that concussion or shaking of the part is prevented which in two instances that came under my notice led to the occurrence of fatal pelvic cellulitis.

A reference to Figure 7 also shows that in retention of urine the posterior wall of the bladder can be explored and commanded sufficiently to admit of its being punctured without injury to the surrounding parts. In children, not only can a stone in the bladder be felt by the finger in the rectum, but, as Mr. Thomas Smith has pointed out, its removal may be facilitated.

Turning to the anterior aspect of the bladder, we should observe that the peritoneum, in its reflection from the back of the abdominal muscles on to the bladder, leaves a space just above the symphysis pubis, where the bladder, when it is distended, may be punctured without injury to the peritoneum.

It is in this position that supra-pubic lithotomy is performed, advantage being taken of the fact that here the bladder may be reached without wounding the peritoneum. Dr. J. G. Garson \* has shown that it is possible by distending the rectum to increase this interval considerably, and thus under certain circumstances, as will presently be mentioned, to facilitate the performance of supra-pubic cystotomy.

Dr. A. Barron has called attention to an arrangement of the fascia immediately in front of the bladder, which surgically is very important.† I will quote his own words:—"Returning now to the transversalis fascia on the anterior abdominal wall, and tracing it downwards from the neighbourhood of the umbilicus, we find that it here splits into two laminæ, the anterior of which passes down behind the rectus muscle, and is attached to the upper border of the pubis; the posterior layer

\* *Edinburgh Med. Journal*, October, 1878.

† *Liverpool Med. Chir. Journal*, January, 1885.

being carried by the urachus to the posterior aspect of the bladder, is there continuous with the recto-vesical, or middle lamella of the visceral fascia, and finally along the base of the bladder with the posterior part of the capsule of the prostate. It will now be seen that a space exists between these two laminae of the transversalis fascia which is termed the porta vesicæ of Retzius, or the pre-vesical space, into which, and not into the sub-peritonæal space, the bladder rises when distended. This pre-vesical space is of the greatest importance in surgery.

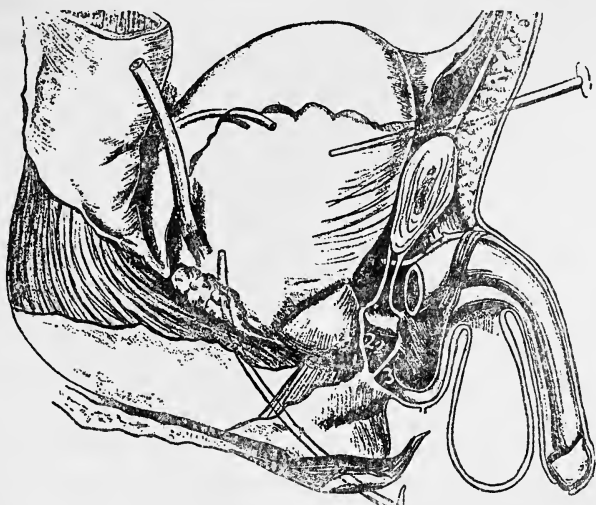


Fig. 7.

In opening the bladder above the pubis it is entered, and the viscus can be opened to a considerable extent in the middle line without the operator running any risk of injuring the peritonæum, or entering the extra-peritonæal fatty tissue, the operation being entirely confined to the space in question, so long as the incision is confined to the anterior aspect of the bladder, and does not extend backwards beyond the urachus. Again, when, as frequently happens, there is fracture of the pelvis with extra-peritoneal rupture of the bladder by a fractured pubic ramus, it is evident that the urine will be discharged into

the pre-vesical space, and supposing the bladder to be drained by a perinæal incision, this incision will be very unlikely to drain the space of its contained urine, which will remain mixed with blood, and in contact with the fractured bone." Of course, it will be understood that this disposition of the fasciæ can only be regarded as a space when something, either the bladder as it distends, or fluid when extravasated, make their way into it. Under all circumstances are these fascial boundaries of the interval capable of being demonstrated on the cadaver.

I shall again refer to it and its surgical importance when I come to speak in detail of supra-pubic cystotomy and rupture of the bladder.

We should now proceed to notice the attachments and connections of the various fasciæ having relation with the urethra; for we shall find that when matter forms around the urethra, or extravasation of urine occurs, the direction taken by these fluids is entirely influenced by the attachments of the fasciæ. If you refer to a side view of the pelvic fasciæ, you will see that there are three distinct compartments where, about the perinæum, fluid may collect. In each, the course taken by the fluid—be it urine or matter—will be different, the difference being determined by the connections of the layers of fasciæ between which it is placed. When matter forms around the prostate in the compartment marked 1, it cannot come forwards, in consequence of the triangular ligament; it therefore goes backwards into the cellular tissue of the pelvis, where it will spread with great rapidity and fatality, under the name of pelvic cellulitis. The formation of matter in this position may be occasioned by injuries to the prostatic portion of the urethra. Not unfrequently it is the cause of death in lithotomy, where the incision into the prostate has been so free as to include its fibrous investment. When matter forms in compartment No. 2, between the layers of the triangular ligament, it either bursts into the urethra or makes its way towards the anus. Suppuration in this position not unfrequently takes

place as a consequence of a very acute urethritis, and gives rise to the belief that inflammation of the prostate has occurred. Abscess here often simulates suppuration in the prostate, and is mistaken for it. Retention of urine, from pressure on the urethra, may in this way be caused, and relief is not obtained until either the abscess bursts into the urethra, or is opened by an incision.

When matter forms in compartment 3—that is to say, between the superficial perinæal fascia and the superficial layer of the triangular ligament—fluid is conducted towards the scrotum, and from thence it may pass to the anterior surface of the abdominal parietes, over a very considerable area. If unrelieved, the damage that is done to the tissues in contact with extravasated urine is immense; large portions of skin and cellular tissue slough and are discharged, and high constitutional symptoms, which tend rapidly to assume a typhoid character, not unfrequently are consequent upon the presence of urine in this position. Unless relief is speedily afforded by the knife, urine may travel as far as the umbilicus, or even above it, as we have seen on several occasions.

Passing to the interior of the urethra, I would remind you that within it are the openings of the canals conveying the semen, and other fluids which it is supposed are engaged in its elaboration. Hence we may infer that that which is an obstacle to the natural escape of urine is, *pro tanto*, an obstacle to the efficient discharge of the other secretion; and this undoubtedly we find to be the case, for sterility on the part of the male is frequently met with as one of the consequences of stricture.

There is one very important landmark which must not be passed by unnoticed. If you expose the perinæum, you will see that it is marked along the median line by a prominent ridge or elevation, called the raphé. This is a guide to us in many operations on this part. Along it the perinæum can be incised for stricture, abscess, or extravasation, to any necessary depth, with no risk of serious hæmorrhage occurring,

whilst in the operation of lateral lithotomy it indicates the position of our first incision. When the perinæum is tumid from extravasation of urine or suppuration, it not unfrequently happens that the raphé is more or less pushed over to one side or the other, or even slightly curved. The incision to open the perinæum must correspond with such a deflection, otherwise troublesome hæmorrhage is likely to follow.

Where incisions into the scrotum are required for giving vent to urine which has become extravasated, these are best made on either side of the raphé, where the fluid sometimes collects in considerable quantity. The incisions should be sufficiently long, and extend well into the œdematous cellular tissue, so as to permit the escaped fluid and purulent matter to be squeezed out with the hand. In this way, large quantities of intensely irritating fluid may be removed, and gangrene of the tissues prevented. No fear of hæmorrhage need here be entertained. Under these circumstances it is also generally necessary to incise the body of the penis on either side, otherwise sloughing is sure to follow if the urine has reached the sub-cutaneous tissue of this organ. In some forms of urinary extravasation, where the stricture is in the penile portion of the urethra, the penis is the first part to become œdematous. When the extravasation is from the deeper portion of the canal, this is generally noticed after the scrotum has become distended. It is most important to prevent the skin of the penis sloughing indiscriminately, otherwise large cicatrices may be left, which seriously interfere with the subsequent erection of the organ. I have met with two or three instances of this, and most troublesome distortions they proved to treat. Timely incisions in proper directions would have prevented this.

Such, then, are a few considerations which a knowledge of the anatomy and relations of these parts suggest. They are sufficient to indicate the necessity of this study as the only proper preliminary to undertaking the management of their disorders.

## THIRD LECTURE.

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### SYMPTOMS OF STRICTURE—GRANULAR URETHRITIS—CONSEQUENCES OF STRICTURE ON THE GENITO-URINARY ORGANS—NERVOUS AND SPASMODIC AFFECTIONS SIMULATING STRICTURE.

THE patient's suspicions that he is suffering from stricture are usually first aroused by his noticing some alteration in the force, direction, or size of the stream of urine in the act of micturition. Unfortunately, however, for him, these indications do not generally become apparent until the disorder has made some considerable progress. It is of the first importance, then, that we should consider what may be regarded as the premonitory stage.

If we analyse the symptoms of stricture, excluding, for obvious reasons, cases of traumatic stricture and such-like causes of obstruction, we shall be able to refer them to one of two classes—viz., (*a*) symptoms indicating inflammation, and (*b*) symptoms of obstruction.

The symptoms of the first class—namely, those of inflammation—not only precede those of obstruction, but usually extend over a considerable period of time. Most frequently they are consequent on an acute gonorrhœa, and their extreme slowness, and the little inconvenience they occasion, are apt to render the patient almost unmindful of their presence. The only outward sign may be a continuous, though slight, mucopurulent discharge. Such a discharge is usually most obvious in the morning, and is often only sufficient to glue together the lips of the urethral orifice.

Further examination proves the existence, in varying degrees, of what are regarded as the cardinal symptoms of inflammation. Should we proceed to examine the urethra of such a patient with a bougie, there is *pain*, and an unpleasant sensation of *heat* as the instrument passes over the seat of the disorder; and that some inflammatory exudation—*swelling*—has taken place is evident by the resistance to the instrument that the operator is conscious of. That there is *redness*, or congestion of the part affected, is proved by endoscopic examination, should this be considered necessary for completing the diagnosis. These signs of inflammation—*pain*, *heat*, *redness*, and *swelling*—are usually accompanied by some obvious perversion of function. Not rarely there is frequency in micturition, as well as painful nocturnal emissions. These symptoms indicate the premonitory stage of stricture. The urethra presents a granular appearance, a condition which has its counterpart in the unhealthy eyelids of scrofulous children, with which we are so familiar.

As viewed through the endoscope, the healthy urethra “resembles very closely, on a smaller scale, the rectum as seen through a speculum, or the vagina, but with the difference that the folds of mucous membrane of the healthy urethra are longitudinal instead of transverse.”\* The chronically inflamed urethra presents a somewhat blotched appearance, the radiating lines being concealed by points resembling granulations. The contrast between the healthy and desquamated urethra is seen in the Fig. 8.  following sketch (from Heath).

The inflammatory or premonitory symptoms, if unchecked, sooner or later give place to those indicating that obstruction has taken place; the stream of urine as it issues is wanting in force, or it is twisted or diminished in size, and as the contraction goes on these inconveniences increase. A very common symptom of stricture is the involuntary discharge of a

\* Heath, *On the Endoscope*, p. 7.

small quantity of urine after the person has supposed he has finished, thus annoying him by wetting his linen.

In some cases the symptoms are of an anomalous character, and have no obvious correspondence with the description I have given. The formation of a hernia, or an enlargement of the testicle, may be the only indication of an urethral obstruction. It is also not uncommon to meet with cases where a sudden retention of urine is the first intimation to the patient that he is suffering from stricture. Incontinence of urine, especially at night, is sometimes caused by stricture. I was recently consulted by a medical man in reference to this symptom, which I was able to explain and remove by the detection and treatment of a tight stricture he was not previously aware of. Blood and albumen in the urine may also be caused by a stricture. I have known both disappear in many instances where the obstruction has been treated.

It seems very strange that progressive changes in the urethra, such as stricture involves, should go on without the patient being aware of them, until, as it were, a crisis is reached. But so it is. A certain proportion of cases fail in affording a satisfactory explanation, further than to suggest that the patient has been wanting in the commonest observation.

That stricture may render a man sexually unproductive, I think there is abundant evidence. I have known the successful treatment of a stricture immediately followed by conception on the part of the wife after years of supposed sterility. A medical man, whom I treated for stricture, used to complain to me that after lascivious dreams, from which he occasionally had the misfortune to suffer after an exposure to the sun on the West Coast of Africa, he was conscious of severe nervous prostration, though there was no external evidence that a seminal emission had taken place during sleep. On each occasion, however, when this complaint was made, abundant spermatozoa were found in the urine. Both Dr. Barron and myself were able to satisfy ourselves upon this

point. It seemed obvious that the stricture prevented the emission taking place in the usual way, and that consequently the seminal fluid made its way backwards into the bladder when the orgasm took place.

The obstructive material, whilst these symptoms are continuing, gradually alters in its character. At first, it is merely an inflammatory exudation, soft and readily compressible; later on, as it becomes organised, it tends to resemble, not only in appearance, but also in its disposition to contract, the tissue of which scars are made up. The degree of resistance that this adventitious tissue is capable of offering is often remarkable, whilst in extent it is in some instances sufficient to convert the whole perinæum and scrotum into an indurated mass.

The worst feature connected with this deposit is its indisposition to become to any extent absorbed. You may exercise pressure upon it, you may divide it with the knife, or act upon it with caustics, but you cannot entirely remove it or deprive it of its inherent quality of contraction. Hence the importance of endeavouring to prevent this kind of tissue formation.

The treatment of advanced stricture will, therefore, be seen to resolve itself to a great extent into palliating and adapting, and this has been brought to such perfection that it is remarkable how little distress the patient may be conscious of, provided he exercise a moderate amount of care and precaution in the management of his own case. And, in speaking of treatment, it is well that we should understand our position in reference to the disorder we undertake to treat. Fortunately for mankind, there are many of its ailments which have a natural tendency towards what I may call a spontaneous cure, and even some of the most malignant diseases occasionally undergo changes of a benign character, remain quiescent, and cease to trouble. It is not so, as a rule, with stricture, unless it is kept in check by appropriate means; it is progressive, and the longer it remains untreated, the more hurtful it becomes.

It will be desirable here to note the remoter changes that

take place. As the contraction increases, the urethra behind the stricture becomes dilated, so much so that in some cases pouches are formed in which urine is apt to collect. In long-standing strictures these dilatations are so well marked as not to disappear after the stricture has been remedied. A gentleman, who some time previously had a tight stricture divided at the orifice of his urethra, consulted me in consequence of the very disagreeable odour of his urine when first passed in the morning. On examining him with a catheter, I found that urine collected in two very considerable pouches in his urethra. I advised him to drain his urethra every night, just before going to bed, by means of a catheter, slowly introduced and withdrawn. This had the desired effect, and speedily removed the inconvenience he complained of. These pouch-like dilatations behind the stricture, which not unfrequently extend to the small ducts and lacunæ opening into the canal, are often the cause of peri-urethral, or, as it is otherwise called, urinary, abscess. After an instrument has passed the stricture, its point is apt to catch in these dilated lacunæ, and its further progress is arrested.

The constant presence of urine in the urethra behind the stricture sets up inflammation, not only within the canal, but also around it. Should suppuration occur, unless relief is given externally, the matter will find its way, by ulceration, into the urethra, and extravasation of urine follows. In the great majority of cases it is in this way, I believe, that extravasation happens, and not, as we are generally led to suppose, by rupture of the urethra behind the stricture.

It has been proposed to take advantage of the distended condition of the urethra behind the stricture to effect dilatation from behind forwards. Mr. Furneaux Jordan describes, in an interesting paper,\* this method of treatment, which he has practised with success.

In addition to these changes in and around the urethra, the

\* *British Medical Journal*, Nov. 9th, 1872.

bladder becomes structurally altered, in consequence of its action and function being disturbed by the obstacle to micturition. In one case you will find its walls thickened and its cavity contracted, whilst in another it is expanded, with walls thinner than natural. In the former it is hypertrophied, for the purpose of overcoming the resistance offered by the stricture to the natural discharge of the urine; just as the heart, by an increase in its bulk, compensates for the resistance that is offered to it by an impeded circulation. Where the bladder is dilated and thinned, it seems to have gradually yielded to an obstacle which it has been beyond its power to overcome. What determines the one or other condition is, I fear, little more than a matter of surmise.\* Probably the degree of irritability the stricture occasions, or the disposition of the patient, has something to do with it.

It occasionally happens, though rarely, that rupture of the bladder takes place during the effort of a patient to overcome a stricture. An instance of this came under my notice some time ago. Here the patient had been suffering from retention for some days. When admitted into the Infirmary he was in a state of collapse, from which he never rallied, dying eighteen hours afterwards. A catheter was introduced into the bladder without difficulty immediately after his admission, but only a few drops of blood-stained fluid escaped. At the *post mortem* examination, in the posterior wall of the bladder was found a rupture communicating with the cavity of the peritoneum. The edge of the opening was covered with lymph, and the rent measured, when not stretched, an inch and a half in length. There were also signs of peritonitis. Though there could be no

\* Mr. Cadge's explanation is a probable one:—"Muscular hypertrophy of the bladder, as of the heart, may exist under two conditions, simple hypertrophy or hypertrophy with dilatation. The former is seen most frequently in cases where the obstruction is due to stricture, where the patients are of middle age, and in the possession of fair vital power; the latter in the aged, whose enlarged prostate is the impediment, whose vital power is on the wane, and in whom the bladder is apt to exhibit atony or even paralysis."—*British Medical Journal*, October 2, 1875.

doubt of the patient having suffered from retention, no sensible diminution of the calibre of the urethra could be discovered, so that, in the absence of any history of an injury, we must conclude that the obstacle was occasioned by spasm, and that the rupture was caused by natural efforts. The history of the case would admit of no other conclusion than this, which, I believe, is the correct one. The specimen is preserved in the Museum of the School.

Going still further back, we find the ureters and kidneys yielding to the pressure of the *vis a fronte*; these may, in the course of time, become mere tortuous tubes, and little else than subsidiary bladders, as you may gather from numerous specimens.

Kidney disease, varying from slight congestion to almost complete disorganisation, is a frequent concomitant of stricture; this is a fact which should never be lost sight of, and brings me to notice the importance of examining the urine.\*

No operation, however slight, can be regarded as absolutely free from danger, and even the passing of a catheter, simple as it seems, forms no exception to this rule. In an interesting article to which I shall have occasion again to refer, on urethral fever, † my colleague, Mr. Banks, narrates a case I well remember, where death occurred six and a half hours subsequently to the passage of a bougie. Allusion is also made in the same paper to a case of Dr. Padley's, in the Infirmary, where something similar happened. To such exceptional cases I shall again refer.

As no subjects are less suited for operative treatment than

\* "Among the cases of stricture, one hundred deaths occurred (in Guy's Hospital) in nineteen years, giving a yearly average of about 5·26. Of the whole number of cases, the kidneys were suppurating in forty-one of the hundred; they were wasted away or inflamed in eighteen; in seven they showed evidence of the changes included under the term Bright's disease, or were cystic; while, in the remaining thirty-four, they were healthy. Thus fifty-nine, or nearly three-fifths of all the cases, had advanced disease of the kidneys."—J. F. Goodhart, *Guy's Hospital Reports*, Series iii., vol. xix.

† *Edinburgh Medical Journal*, June, 1871.

those who are suffering from structural kidney disorder, every means should be taken for determining the precise condition of these organs before deciding, in a case of stricture, the line of treatment that is to be pursued, and hence a thorough examination of the urine is of the first importance.

The existence of advanced kidney disease will limit us to such proceedings as have for their object the preservation of life, independently of other considerations, and under such circumstances the range of treatment becomes restricted. I shall in another lecture make observations on the examination of the urine, and, as occasion arises, comment upon certain points connected with the treatment of the various abnormalities that may here be discovered.

Amongst the remoter effects of stricture of the urethra, or any obstruction to the voiding of urine, I cannot refrain from noticing those which may be traceable to more or less muscular straining for the purpose of overcoming the obstacle to micturition. The formation of a hernia, or the production of a prolapse of the bowel, are the better known illustrations of this kind. Two cases have come under my notice where, in persons suffering from great difficulty in urinating, the bursting of an internal aneurism was the immediate cause of death. Whether the chronic straining had anything to do with the production of the aneurisms, or favoured their rupture, is a matter for speculation. I merely record the observation, as well as my belief, that these two conditions were in these instances related.

Before concluding my remarks on the symptoms of organic stricture, I must refer to certain nervous and spasmodic affections of the urethra which simulate it. Of this class of cases, which are sometimes misleading, you see comparatively few in hospital practice, and it is from other sources that I must chiefly draw the illustrations which will be necessary for my purpose. Because these cases are wanting in certain physical signs, do not for a moment suppose that those who complain of them do so for the purpose alone of exciting sympathy or com-

miseration ; on the contrary, I can assure you the distress that is thus occasioned often renders the lives of those who suffer from such symptoms very miserable, and consequently they are deserving of most careful consideration. I do not know how it is, but when one comes to speak of disorders which are described as of "nervous" origin, we almost unconsciously add the caution that I have given, as if under the generic term of "nervous affection" the most horrible and distressing sensations are not included. Who has not seen patients annoyed beyond measure by that condition which has been so graphically described by Sir James Paget as "stammering with the urinary organs."\* One such stammerer, an elderly gentleman, with a large prostate, I attended for a long time. He used to spend his days in selecting words, the repetition of which, he thought, during micturition, favoured the act. He kept a list of these words by his side, crossing one off when it appeared to him to have lost its effect, or was supplanted by one more potent. Many words were coined for this purpose. It was impossible to refrain from a smile on seeing, as I had often to do, micturition being performed whilst a word was rapidly repeated as if invoking the assistance of some ancient Deity who was specially interested in such matters. And yet to the end of his life my old and valued friend believed in the efficacy of this proceeding. Another gentleman I attended was in the habit of provoking micturition by the sound of water falling into a basin ; whilst a lady, after an operation where catheterism was necessary, first spontaneously passed water after the nurse had given her a mouthful of cold water ; for many days afterwards she could never repeat the act until she had previously taken a drink. I could multiply such examples, but it would be at the expense of your time, if not, you might think, of your credulity ; but I have said sufficient to show the importance of recognising the morbid effect of nervous influence on micturition. You will not cure your patients by asserting your belief in the non-reality of

\* *Clinical Lectures*, by Sir James Paget, Bart.

their ailments, but having carefully established the absence of any organic disease, you may, by your counsel and advice, as well as by your medicine, often do much in restoring the nerve-tone which is deficient, and so prevent the patient drifting into a hopelessly depressed mental condition.

Again, there are a variety of morbid influences, chiefly constitutional, which undoubtedly interfere with micturition by inducing spasm, more or less persistent, in the muscles connected with the deeper portion of the urethra and the neck of the bladder. Under the title of *Contracture du Col Vésical*, various morbid conditions have been described, chiefly by French authorities, as to the existence of which no possible doubt can be entertained, however you may choose to explain them. Of the more recent treatises on the subject, that by Dr. Delafosse may be advantageously studied by those requiring further information.\* Examine these cases as you will, with all the light the literature of the subject can throw upon them, you can come to no other conclusion than that the word "spasm," with which we are so well acquainted, as accurately as anything else, describes the nature of the impediment to micturition which is their prominent feature. The exciting causes of such spasm are local and constitutional, the former including irritations proceeding from the rectum, such as piles or fissures, whilst amongst constitutional excitants the taints of gout and of rheumatism are the most frequent. The French authorities to whom I have referred lay great stress on rheumatism as an exciting cause of this affection.

In addition to those general principles of treatment which rheumatism and gout require, very great advantage will be found in these cases from a course of treatment at certain watering places. Of these I may mention as being best adapted to this purpose, Vichy, Contrexéville, † Vittel, and Evian.

\* *Sur la Contracture du Col Vésical*, par le Dr. Delefosse. Paris, 1879.

† "Notes of a Visit to Contrexéville," by Dr. F. R. Cruise, M.D., Dublin. Reprinted as a Pamphlet from the *Lancet* of June 20, 1885.

As to local treatment, I have little to say. When the exciting cause of the spasm has been removed, I have found benefit from the application to the deep portion of the urethra, for the purpose of removing the extreme sensitiveness which sometimes remains, of a ten per cent. solution of cocaine. One or two applications of this sometimes acts like a charm.

In arriving at the conclusion that a case of impeded or hesitating micturition is functional and independent of structural alteration, you must remove all source of error by a careful physical examination of the urethra. If you learn to acquire delicacy and tact in the use of urethral instruments necessary for the purpose, you will never give your patient cause to regret that he has submitted to such an exploration ; on the contrary, in the absence of true stricture, he will be comforted by the assurance that he can be completely and permanently relieved.

Stricture of the female urethra is not a common affection. In the few instances that have come under my notice it was referable to injuries in connection with parturition, and chiefly involved the external meatus.

## FOURTH LECTURE.

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### EXAMINATION OF THE URINE.

AN examination of the urine is an essential preliminary to the investigation of all diseases affecting any portion of the urinary tract. Such examination may at once reveal the cause of the disease, and if it fail to do this, it is no less valuable in determining the particular line of treatment to be adopted. For instance, in a case of stricture, or of stone, a normal or an abnormal condition of the kidneys will indicate respectively the means we shall select for removing the cause of the patient's symptoms. Save when there is some urgency or necessity for prompt interference, I never submit the urethra or bladder to any treatment requiring the introduction of instruments until I have first ascertained the state of the urine, until I have formed an estimate, not of the condition of the part that may alone be the seat of the disease, but, if I may use the term, of the general health of the whole urinary apparatus. The urethra or the bladder, as the case may be, is only a part of a system, and a knowledge of the whole is necessary to the proper understanding, pathologically and therapeutically, of any particular part. Those who are accustomed to see my practice know the importance I attach to this observation, and frequently see the good reasons that show themselves for acting up to it.

It would be impossible for me, in a course such as this, to compass all that you should know of the physiology, chemistry, and pathology of the urine. I shall only attempt to place before you certain broad clinical features having reference to

abnormal conditions of the urine, with some practical deductions obtainable therefrom.

I will take for a starting point a definition of what normal urine should be; and I cannot do better than select the words of Sir William Roberts:—"Healthy urine is a clear, watery, amber-coloured, saline solution, generally acid, with a specific gravity of about 1020."\* Urine differing from this description cannot be regarded as typical of that which is healthy, though the deviation may be so slight or temporary as not to be accompanied by other signs of ill-health.

First, with regard to the *specific gravity* of the urine. This is taken by means of the urinometer, and indicates the density of the urine, from which a rough estimate of the solids it contains may be made. The last two figures of the specific gravity being doubled, the quotient approximately represents the amount of solid matter per 1000. Thus urine of specific gravity 1020 would contain about forty grains of solids. Specific gravity must be considered as indicating only the density of the urine, regardless of the relative proportion of the constituent salts or other solids it may contain; for, as Dr. Carter remarks, "two urines having the same specific gravity may yet differ very much from each other in the relative amount of their solids, one having a large quantity of organic products and a relatively smaller quantity of salts, and *vice versa*."†

When a person is in the habit of passing urine of a low specific gravity, it is necessary to be especially cautious in his case to avoid doing anything which would shock him, and so interfere with the feeble excretory action of his kidneys. Such persons as these are often on the borderland of uræmia, or urinary poisoning. Sir James Paget very pertinently remarks, "Let me tell you of a symptom which must make you specially cautious if you have to catheterise elderly or old men. If they are passing large quantities of pale urine, of low specific

\* *On Urinary and Renal Diseases*, by Sir W. Roberts.

† *On Renal and Urinary Diseases*, by Dr. W. Carter.

gravity, whether containing a trace of albumen or not, they will be in danger from even the most gentle catheterism.”\*

When I have, as we all have, to pass an instrument for such persons, the condition referred to makes me additionally careful to provide against any ill after-consequences, by adopting those means which we know of as being likely to ward them off. And in this I am generally successful.

In hysterical persons the low specific gravity of the urine is, I believe, the most frequent cause of the irritability of the bladder from which they suffer. The nearer urine approaches in every respect to a healthy standard, the less irritating it is. A patient who has to wash out his nasal passages for ozæna, finds a saline solution far less irritating for the purpose than pure water, and so it is with the urine. Sir William Roberts has pointed out that, when urine is secreted under mechanical obstruction, as in cases of calculus of the ureter, it is of a low specific gravity.

When urine is irritating from being too concentrated, we bring it down to its normal standard by diluents such as barley water or linseed tea, with much comfort to the patient. Patients suffering from some forms of irritability of the bladder, such, for instance, as that connected with prostatic disease, often deny themselves fluid with the hope that in this way they may diminish in frequency the calls to urinate. This course is generally attended with an aggravation of their sufferings, for in addition to their thirst, the urine is rendered the more irritating to the parts with which it comes in contact.

Having noted the specific gravity, the *reaction* of the urine is then determined by test-paper. It may be stated generally that healthy urine is acid, being rendered so by the presence of free acids and acid salts. The alkalinity of urine is traceable to two different causes: (1) to the presence of a fixed alkali, a condition usually associated with a debilitated state of health; and (2) to the presence of a volatile alkali (ammonia), the

\* *Clinical Lectures*, by Sir James Paget, Bart.

result, with hardly an exception, of the decomposition of urea.

The mode in which the urine becomes ammoniacal from decomposition is easily explained. "One molecule of urea with two molecules of water, by a simple re-arrangement of their particles, become converted into one molecule of carbonate of ammonia; one molecule of urea  $\text{CO N}_2 \text{H}_4 + 2 \text{H}_2 \text{O} = (\text{NH}_4)_2 \text{CO}_3$ . This change is so easily brought about that mere boiling of a solution of urea in distilled water is sufficient to effect it.

"To distinguish between the volatile and fixed alkali, the test-paper, after being rendered blue, should be allowed to dry in the open air. If the blue colour persist after complete desiccation, the alkali is fixed; if it disappear, and the original colour be restored, the alkalescence is due to ammonia. The smell of the urine is also a useful indication in such cases."\*

Persons passing urine which is alkaline by reason of the presence of a fixed base, usually require medical rather than surgical aid. Generally, alkaline urine indicates a weakly physical condition, combined, it may be, with a highly strung state of the nervous system. It is in the latter subjects that opium is of the greatest value. By counteracting the injurious effects of nerve tension it often restores a normal reaction to the urine, and in this way is realised Sir Thomas Watson's observation, that "no single drug probably has so much power in rendering alkaline urine acid as opium."†

I have often noted, incidentally, that a long persistence of urine presenting this character has eventually resulted in the development of the graver symptoms of Bright's disease of the kidneys. What relation this state of the excretion has with structural alteration is hardly one upon which I should like to venture an opinion. I merely record an observation I have frequently made in the course of practice, which may be a coincidence. Urine of this kind usually indicates nothing

\* Sir William Roberts's *Op. Cit.*

† *Principles and Practice of Medicine*, 5th ed., vol. ii, p. 712.

more than an overwrought nervous system, capable of restoration by rest and care, but it should not be permitted to become excessive or persistent.

As bearing upon what has been said about the decomposition of urea as a cause of alkaline urine, I may mention a case I saw some little time ago, which much interested me. It was one of stricture, with extravasation of urine into the scrotum, occurring in a person suffering from Bright's disease of the kidneys. Though the extravasation had come on suddenly, and had existed for twenty-four hours unrelieved, there were no signs of acute inflammatory action and commencing gangrene, such as are usually expected. However, the tension being considerable, I incised the parts involved in the extravasation. As the fluid escaped from the incisions, I noticed that it had not that strong ammoniacal odour which is so perceptible in such cases. Subsequently I treated the stricture, which was exceedingly tight, and for some time kept in abeyance the more threatening urinary symptoms. I was somewhat puzzled for an explanation, as I felt sure that the case was one of extravasation, and not of acute scrotal œdema. How was it then that extravasated urine failed to create gangrene? I collected some of the urine as it trickled through the wound, and compared it with some subsequently drawn off by the catheter. I found them identical, and in both there was an almost complete absence of urea. This then, to my mind, solved the mystery, and explained that as there was no urea to decompose there was no source for the production of the ammonia by which the destruction of tissues in connection with extravasated normal urine is effected. By the absence of urea the urine was rendered chemically harmless to the tissues with which it came in contact.

The urine when rendered alkaline by a volatile alkali is probably to the surgeon the more interesting condition, as it is met with in those cases where this excretion has been retained within the bladder until it has decomposed in the way I have

mentioned. Surgically we meet with this in fractures of the spine, in advanced stricture, and prostatic disease where there is a mechanical obstacle to the bladder being emptied. In a case shown at the Medical Institution, during the session of 1878-79, by the late Dr. Spratley, where a fractured spine had been advantageously treated by extension and a Sayre's jacket, not only was the ammoniacal condition of the urine, due to paralysis of the bladder, a source of persistent trouble, but this state, in spite of constant care by catheterism and irrigation, led to the formation of numerous phosphatic calculi with marvellous rapidity, which caused the patient much annoyance. In this way the whole mucous membrane of the bladder may be covered by concreted phosphates.

Further than this, we find the presence of ammonia in the urine acts as an irritant to the structures in contact with it, and inflammation of the coats of the bladder, more or less acute, adds to the patient's distress. A moment's reflection shows how much may be done, not only to prevent but to remedy such a serious complication to the states of disease I have mentioned, by the employment of catheterism and ablution of the bladder and urethra. The sense of smell alone is often sufficient to indicate to the practitioner the necessity for adopting these precautions.

Therapeutically, the recognition of the cause of the abnormal reaction of the urine, whether it be due to a fixed or a volatile alkali, is a matter of much importance. The fixed alkali, as I have already remarked, is for the most part met with in persons with feeble powers of life, persons who invariably improve in condition with a generous diet and tonics containing one or other of the mineral acids. To give acids with the view of correcting both the health and the urine of the patient who always has in his bladder a residuum of urine, necessarily of an alkaline reaction, due to decomposition, is worse than useless; yet I have seen this done, and justified on the ground that the urine was alkaline, no thought being

attached to the consideration that the cause of the alkalinity was essentially one that could only be removed by mechanical means.

Though urine that is acid can be rendered alkaline by the administration of alkalies, the converse does not hold good except in a sense which is not generally appreciated. That urine is often rendered exceedingly acid and irritating by drugs which have the effect of disturbing digestion, I have no doubt. If I remember correctly, it was Dr. Bence Jones who showed that it was in this way alone that urine could be rendered acid. In practice I have particularly noticed this ill-effect in the administration of specific medicines, such as copaiba and cubebs for gonorrhœa. These drugs are exceedingly nauseous, and their use is not unfrequently followed by disturbed digestion and a highly acid condition of the urine, which prejudices their healing effect on the urinary passages. For some time I was at a loss to explain how the old-fashioned, but very disagreeable, copaiba mixture, which contained sufficient liquor potassæ to render the balsam miscible, was so much more efficacious than the more elegant and modern forms of capsules and confections. The efficacy of the old mixture is, I believe, largely due to the alkali it contains counteracting any excess of acid which the drug creates. In practice I have proved this to be the case, not only with copaiba but with other drugs of a like nature and purpose. In giving cubebs, I find that its combination with bicarbonate of potash greatly increases its efficacy as an anti-blennorrhagic.

Ammoniacal urine has a further chemical importance, as in this state of alkalinity the triple phosphates are thrown down, and the formation of this variety of calculus is favoured. Hence persons who are passing urine that is ammoniacal are not only liable to attacks of cystitis, from the ammonia that is evolved, but, in addition, to the formation of phosphatic stones.

Proceeding further, *albumen* and *sugar* should next be searched for, the probability of finding the one or the other

being suggested by the specific gravity, urine containing albumen being usually low, whilst when sugar is present it is the reverse. This, however, must be accepted with the caution that it is only generally true.

The persistent presence of albumen, when not due to the existence of some other fluid in the urine, such as pus, blood, or semen, points to a mechanical impediment to the circulation through, or disease of, the kidneys, and therefore is a symptom of grave significance. The detection of albumen under these circumstances must be followed up by a careful microscopical examination of the urine, in search of casts or other direct evidence of renal mischief. For reasons that I have already urged, the suspicion that kidney mischief may exist, as complicating some surgical disorder, must be carefully weighed, in order that the surgeon may be able to judge what, if any, operative measures are to be adopted in a case where, under other circumstances, such would have been desirable.

It should be remembered, in connection with the subject of albuminuria, that some recent observations, conducted on a sufficiently large scale for the purposes of life insurance, and upon army recruits, have shown that a certain proportion of otherwise healthy persons, and with no other signs of structural kidney disease, have albumen in appreciable quantities in their urine.\* From a careful perusal of these statements, I cannot suppose that they are in any way open to fallacy; we must, however, always attach considerable importance to the existence of albumen in the urine, however unexplainable it may be.

In testing the urine for albumen, even for surgical purposes, we should bear in mind that it is sometimes necessary to test samples passed at different times and under varying circumstances; for instance, urine passed after a day's hard work, when there has been much standing, will sometimes be found loaded with albumen, whilst the early morning excretion is

\* *Medical Times and Gazette*, June 21, 1879.

perfectly free from it. Dr. Pavy\* has drawn attention to this important point.

That there is *sugar* in the urine is rendered probable when the specific gravity is over 1030. In reference to its presence I shall not offer any further observations. In the treatment of such affections of the urinary organs as have come under my notice, I have rarely met with it as a complication, and when present it appeared in no way to influence the surgical treatment the local complaint required. In testing for sugar, the cupric test pellets, introduced by Dr. Pavy, will be found exceedingly convenient.†

I shall now pass on to enumerate the various deposits. These, when they exist in any considerable degree, are often apparent to the naked eye, and are a source of apprehension to the patient, who cannot fail to recognise in most instances the abnormality, though he may be unable to appreciate its significance. The deposits will be considered as (1) unorganised, and (2) organised. Not much difficulty, after a little practice, will be experienced in making out the nature of these several deposits; it is in referring them to the precise cause producing them that some hesitation will occasionally be felt. Until you have localised the source of a morbid deposit, your treatment must be empirical. I have known a patient go on having his bladder washed out and treated as if for a cystitis when the pus was derived from a chronic pyelitis. Hence, in examining urinary deposits, we must be specially careful to remove as

\* "At a meeting of the Clinical Society, Feb., 1883, Dr. Pavy exhibited the ferrocyanic test-pellets which he has devised, and which are portable, and remain unchanged when kept in a stoppered bottle. They form a sensitive test, and apparently detect minute quantities of albumen which nitric acid and heat fail to render appreciable. Dr. Oliver, of Harrogate, at the same meeting, exhibited test-papers of various kinds, which can be carried in the pocket-case, are almost unalterable by exposure, and which form more sensitive tests for albumen than either heat or nitric acid."—"On Cyclic Albumen-urea," *Brit. Med. Journal*, Oct. 24, 1885.

† *Proceedings of Clinical Society*, Jan. 23, 1880. These pellets may be obtained from Mr. Cooper, Chemist, 26, Oxford Street, London.

far as possible all sources of fallacy. Furthermore, in the collection and examination of urine the most scrupulous cleanliness is to be observed, otherwise we shall introduce various sources of error which I might mention.

Of the unorganised deposits—namely, *uric acid*, *urates*, *phosphates*, and *oxalates*—I shall not occupy time by any extended notice; to do so would necessitate a reference to their chemistry and physiology beyond the limits of a practical course. I shall, in fact, not ask you to do more than, from the specimens placed before you and the drawings that accompany them, learn to distinguish their respective appearances. Though the variations in the quantities of these salts in the urine—their excess or diminution—chiefly come under the notice of the physician in connection with a number of disordered actions, yet in their relation to the formation of stone, and the consequences produced by obstructed micturition and decomposition of urine, the surgeon must be largely interested.

There is a specimen of cystine to which I would specially ask your attention, as it is rare, and will be again referred to when I narrate the case of the patient from whom it was removed.

I will take the organised deposits in the following order:—Mucus and epithelium, blood, pus, spermatic fluid; these deposits are all of such importance in the investigation of surgical affections of the urinary organs that I shall make some observations on each.

*Mucus and epithelium.*—If you allow a specimen of healthy urine to stand a short time in a glass, a thin flocculent deposit will be observed falling to the bottom of the vessel. This is mucus from off the urinary passages. It is readily distinguishable from all other deposits, the characteristics of which will be noticed in their place. In a doubtful case it must be remembered that urine containing pus yields albumen to the appropriate test, whereas if the cloudiness is due to mucus alone, it does not do so. An excess of mucus in the urine

points to some source of irritation which should be determined if it continues. I have known an increased quantity of mucus in the urine to be the only symptom of stone. You would hardly think it possible that a person could be subjected to a prolonged course of deception by the normal appearance of his own excretion, but I have just now been consulted in reference to a case where a very large sum of money has been obtained from a young gentleman by a notorious quack pointing to the cloud of natural mucus deposited in the urine as being evidence that he was suffering from spermatorrhœa. Of course, this impostor will escape unpunished.

The importance of making observations in regard to changes in the quantity and quality of the urinary mucus will be more fully referred to in a subsequent lecture on the formation of calculi. Hitherto I believe sufficient attention has not been given to this deposit in relation to this subject.

*Blood.*—The presence of blood in the urine is very naturally a source of anxiety to the patient, who usually at once detects its presence by the discoloration it gives rise to; the circumstances under which it appears in the urine must be very closely investigated. In examining blood in the urine, bear in mind the sage piece of advice given by the late Mr. Hilton: "Swim out in water all clots whose origin is doubtful, in order that you may see the shape. Over and over again you will find yourself able to diagnose the case by this simple common-sense expedient."\* Blood that has been clotted in the ureters is sometimes seen in the form of worm-like casts of these tubes.

In falls or blows, where the kidney is lacerated, there is not uncommonly blood in the urine, and when by means of the microscope casts are discovered of the uriniferous tubes, the most conclusive evidence as to the nature of the injury is thus afforded. When blood comes from the kidney it is usually so intimately mixed with the urine as to give the latter a smoky appearance. When from the bladder or pros-

\* *Guy's Hospital Reports*, 1868, p. 20.

tate, as in stone or tumours, blood generally follows micturition, reversing this order of proceeding when the source of hæmorrhage is the urethra, as in acute gonorrhœa. Hæmaturia must not be confounded with hæmoglobinuria, usually a paroxysmal affection, where the urine is discoloured, not with blood-corpuscles, but with their contents—namely, hæmoglobin.\* The most valuable hæmostatics, so far as my experience goes, are ergot of rye, matico, and tincture of iron. The preparation popularly known under the name of “Ruspini’s Styptic,” I have also found of service. In one of the worst cases of hæmaturia from the kidney, associated with stricture, I ever saw, the most marked benefit, when matters were beginning to look very serious, followed the administration of the infusion of matico—a wineglassful given every two hours.

*Pus* is seen in the urine in two different conditions; in acid urine, as minute particles which fall to the bottom of the vessel if the urine is allowed to stand, and giving it a somewhat milky appearance on agitation. Pus in alkaline urine forms a thick gummy mass, which adheres tenaciously to the bottom of the vessel. This difference in appearance in the two urines suggests a test by which the presence of pus is readily recognised. Urine containing pus becomes more viscid and tenacious by the addition of about half its quantity of liquor potassæ, whereas urine containing mucus is rendered less viscid-looking by the alkali. By the microscope we recognise the presence of the pus-corpuscles. As urine containing pus rapidly becomes alkaline by decomposition, its reaction should be taken immediately after it is passed. The reaction of purulent urine is by no means unimportant, as suggesting the probable source of the matter. Pus in acid urine most probably comes either from the urethra or the kidney. If from the former, a drop of matter can generally be made to exude on pressure from the meatus. Pus in urine that is alkaline

\* An interesting paper on this subject, with numerous references, by Dr. Stephen Mackenzie, will be found in the *Lancet*, July 26, 1879.

immediately after it is passed is most probably from the bladder, being frequently met with in stricture, enlargement of the prostate, and tumours of the bladder. The source of the discharge in all cases of purulent urine must be thoroughly inquired into. As I have already said, I have seen a bladder subjected to active local and general treatment when the presence of pus in the bladder was due to a pyelitis in a largely dilated kidney.

In certain cases of abnormal urine, for instance where there is blood or pus, it is a good plan, when the patient is able to go about, to compare the urine which is passed naturally during the day with that which is voided during the night or early morning. Where there is a marked difference between the two, independent of the action of any medicine, the practitioner sometimes obtains an important hint in reference to the value of rest, as well as other matters which should be recognised in the treatment and regimen of the particular case. It is also a good plan to let urine stand for some time in a glass vessel before its examination is considered completed. Where there are different deposits in the same urine, for instance, of mucus, pus, and blood, they will be often found in the course of a few hours to arrange themselves into strata, and thus afford much valuable information, often sufficient to act upon in an emergency, or in the absence of microscopes and re-agents.

*Spermatic fluid.*—Lastly, albumen may be traceable in urine to the spermatic fluid. Persons frequently imagine that they are passing considerable quantities of seminal fluid in the urine, and consequently you should be able to recognise it when present. In the great majority of instances you will be able to assure your patients that their alarm is groundless, and that they must look in another direction for an explanation of any symptoms affecting the genital organs of which they may complain. Great and sometimes irreparable damage has been done, not only to individuals, but to society at large, by

unprincipled persons, whom the law ought to be strong enough to restrain, preying upon that instinct with which we have been the most strongly endowed. The word spermatorrhœa has done service in debauching both the body and the mind, to an extent which it would be difficult to realise, and in doing this the more effectually, the basest frauds and counterfeits have been resorted to. I allude to this matter, inasmuch as not only should you be able to detect spermatorrhœa when it really does exist, but in order that you may be enabled to give assurance to those who have been the victims of the deceit to which I have alluded.

To examine for spermatozoa, the urine should be allowed to stand for a time, so as to permit of the glairy seminal fluid falling to the bottom of the glass. The lowest stratum of the urine may then be submitted to microscopical examination, when, should spermatozoa be present, there will be no difficulty in recognising them.

I have been asked whether, in a very prolonged and aggravated case of true spermatorrhœa, it might be impossible to furnish this proof, by reason of the inability of the exhausted sexual apparatus to furnish the essential and characteristic element of natural semen. To this, with good reason, I would answer, it might be possible. But under such circumstances as these I should expect to find some corresponding sympathy in other portions of the generative apparatus. And such evidence the great majority of cases of alleged spermatorrhœa fail to afford.

In the treatment of nocturnal emissions I have sometimes found great benefit from douching the lower part of the spine, before going to bed, with water of the temperature of 120° Fahr.; when this is effectually done, the relief of this symptom is often immediate. That a full bladder is often an excitant of a seminal flow is a matter of common observation. Patients who are liable to these discharges should avoid, as far as possible, distension of the bladder taking place, particularly in

the early morning, when these flows most commonly occur. In one very obstinate and distressing case of this kind, after a great variety of treatment, both local and general, had been tried, including Lallemand's *porte caustique*, I succeeded in effecting a permanent cure by giving complete effect to the observation just made. By means of a soft catheter introduced into the bladder, to which a piece of rubber tubing was attached, I arranged a contrivance by which the bladder was kept empty during the whole night, the urine being conveyed as it was excreted into a vessel by the bedside. The habit was at once broken, and in a short time the patient was completely cured of an affection which had rendered him very miserable. The apparatus I have referred to was employed for a fortnight, the patient sleeping very comfortably with it. In the few instances I have known where Trousseau's\* compressor has been used for prostatic disease and seminal emissions, I cannot say that I saw much to recommend its adoption.

Let me give you one caution. If, by your examination of all symptoms, and of such evidence as the urine will afford, you come to the conclusion that your patient has no grounds for believing that he is voiding unnaturally his spermatic fluid, do not abruptly accuse him of wilful self-deception. Remember that mentally, if not physically, his condition is a morbid one, and that he requires just as much counsel and sympathy as if he were suffering from any other affection. If a person is weighed down by the dread of some imaginary disorder, you will not gain his confidence by telling him, without explanation, that he is deceiving himself. You will, by so doing, rather drive him into the hands of those by whom his fancies will be encouraged and his alarms intensified. He requires reassurance, and this you must give him, not by dissembling, but by such a rational explanation of his condition as an educated medical man is capable of affording.

The occasional deposits in the urine which patients some-

\* Trousseau's "Clinical Lectures," *New Sydenham Society*, vol. iii, p. 471.

times point to as indicating that they are suffering from spermatozoa are small thread-like bodies of inspissated mucus, which may be seen on holding up the urine to the light. Their nature is at once recognised by the microscope. They are frequently observed in connection with the slighter forms of urethral stricture, when they entirely disappear under the use of the bougie.

You will occasionally meet with very exceptional conditions of urine, both as to odour and appearance, which you must not be unprepared for. Some things are added to it by the patients themselves, for the purpose of fraud. When such is suspected, I need hardly say the mystery can be cleared up by causing the patient to pass water when someone is present. Certain articles of diet and medicines produce an appreciable change in the urine; of these I may mention in illustration asparagus and copaiba. Whenever a patient complains of his urine smelling offensive and persistently so, be sure, before giving an opinion, that the urine is not abnormally retained in any portion of the urinary passages by an impediment to micturition, and so be allowed to decompose.

*Fæcal matter.*—I would remind you that particles of fæcal matter occasionally make their way into the bladder from the bowels, by routes resulting from abscess or ulceration, and discolour the urine. The colour and odour, and detection by the microscope of particles of food, will furnish indications as to the nature of this deposit. In one case my attention was first called to this condition by the patient asserting that he occasionally passed wind into the bladder, which was followed by most severe colicky pains. A fæcal fistula need not necessarily communicate directly with the bladder; in a case recorded by Dr. Ord, the communication was between the bowel and the ureter.\*

Gas is sometimes contained in the bladder as a consequence of decomposition of the urine taking place. In one instance

\* *British Medical Journal*, Sep. 7, 1878.

that came under my notice, where I had no reason to believe that the bladder communicated with the bowels, the patient frequently terminated the act of micturition with the discharge of gas, which reminded me more of the concluding efforts of a syphon soda-water bottle than anything else. What was the cause of it I never could satisfy myself; I merely record what I observed.\* I presume it was the result of some unrecognised tissue or urine decomposition. I lost sight of the patient.

I shall not occupy your time by a reference to the miscellaneous objects you may possibly meet with in the urine; examine them carefully, and you will generally be able to determine what they are, and having done this, you may often form a very good inference as to how they got there. *Apròpos* of this, I cannot help repeating a story I dare say you have heard before. A house-surgeon was examining, under the microscope, for a practitioner of the old school, a specimen of urine. Turning the slide about under the field, he casually remarked to the old gentleman, "Ah! I see you removed this with the catheter." The practitioner was so astonished at this observation that, rather than betray any ignorance, he went away puzzled and silent, forgetting that his young friend, recognising by the microscope the oil-globules, had drawn an almost irresistible conclusion which was correct. The practitioner, regarding this circumstance as showing good powers of observation and deduction, soon after made overtures to the house-surgeon, and a most profitable partnership was the result of this casual but correct remark.

\* Dr. Guiard proposes the term "diabetic pneumaturia," to denominate a condition which he has observed in four cases of urinary affection in the male, complicated with glycosuria. This condition consists in an emission of gas from the bladder, and is said to be independent of any communication with the alimentary canal. The presence of the gas, which has been conjectured, but not yet proved, to consist chiefly of carbonic acid, is explained by the supposition that the glucose has undergone a process of fermentation in the urinary bladder. The escape of the gas occurs in an irregular manner during some part of the act of micturition, and may give rise to a gurgling noise.—*La France Médicale*, vol. i, 1883.

## FIFTH LECTURE.

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### TREATMENT OF STRICTURE — GRADUAL DILATATION — INSTRUMENTS EMPLOYED — THE FILIFORM BOUGIE — ANÆSTHETICS — CONTINUOUS DILATATION.

I NOW come to consider the treatment of stricture, and as dilatation by bougies is the oldest and most extensively employed means, and as all other methods of treatment are more or less subservient to this, it will be proper to give it the first consideration.

Before, however, submitting a case for instrumental treatment, the very important question should be asked, Is the patient in a suitable condition for its advantageous employment? With few exceptions, persons suffering from stricture seek professional assistance at times and under circumstances when they are least fitted to undergo the treatment necessary for their cure. The patient who sends for you to relieve his retention has, most probably, induced this state by an excess of some sort. The urethra has been rendered irritable by the passage, perhaps, of unhealthy urine, which has provoked sufficient spasm of the urethra to convert impeded micturition into complete retention. I have frequently pointed out the great advantage following the employment of rest, and such-like measures, in cases coming to the Infirmary for the treatment of retention.

There was admitted for retention, a patient on whom prolonged efforts had previously been made to pass a catheter. I saw from his clothing that he had been bleeding profusely. His bladder could be felt distended above the pubes, though not

largely so. Under these circumstances, I ordered him a hot bath and a dose of laudanum, and afterwards to be well covered up with hot blankets. Thus he was enabled gradually to empty his bladder, and on the third day after his admission, at the first trial, I passed a small bougie through a tight stricture without drawing a drop of blood. Prolonged catheterism is in itself an evil; every deviation the instrument makes from the course of the urethra occasions a rent, and every rent leaves a scar, so that in this way the original stricture may be considerably increased. When circumstances will permit of it, the employment of rest, and attention to the condition of the urine and the general health, not only facilitate the passage of instruments along the urethra, but render their use much more serviceable.

Under ordinary circumstances, I find that the recumbent position is the best for the patient to be placed in for catheterism. He is more at his ease, and more complete muscular relaxation is thus obtained. In cases of enlarged prostate the erect position sometimes adds to the difficulty of introducing a catheter by reason of the central portion, when this is involved, pressing forwards over the end of the instrument. On placing the patient in the horizontal position, the growth falls back and permits the catheter to pass with ease. Occasionally it is necessary to place the patient under the influence of an anæsthetic. As this cannot safely or conveniently be done in any other than the horizontal posture, it is as well you should accustom yourself to this position of your patient, otherwise you may expect to find yourself somewhat awkward in your manipulations. If you are only accustomed to catheterise patients standing with their backs against a wall how can you expect to be dexterous with the lithotrite.

I need not describe to you how to pass a catheter; observation and a little patience on your part will enable you to overcome those slight impediments which even the normal urethra presents. John Bell, in his *Principles of Surgery*, very aptly

remarks, "There is no operation with which I should more earnestly entreat the young surgeon to make himself acquainted than this of introducing the catheter." *Festina lente*—be patient and never resort to force. Endeavour to attain your object without giving pain or causing hæmorrhage. There is no necessity for either; or rather I would say, the surgeon should know from the first feel of the parts with his catheter whether there is likely to be pain; and if so, there is just as much need for an anæsthetic in this procedure as there is in any other operation in surgery. A few drops of a ten per cent. solution of cocaine injected into the urethra and retained for a few minutes before an instrument is passed renders the canal practically insensitve. I do not know anything which interferes more with the treatment of urethral affections than the apprehension, on a patient's part, of undergoing a repetition of catheterism where bleeding and pain were the chief features of the proceeding. Be careful, then, to avoid such an impression being formed, as it will seriously interfere with the carrying out of the necessary treatment. The most serious hitch that young operators experience in passing catheters, even along normal urethras, is when the point of the instrument reaches what I have called the fixed portion of the canal. On its way through the urethra, anterior to the triangular ligament, the catheter is apt, by gravity, to exercise a greater pressure on the floor than on the roof of the urethra; consequently, when it arrives at the fixed point, the instrument is below the level of the aperture in the ligament.

This is shown in Figure 8, from Dittel. If you exercise pressure, the urethra will be torn, and blood will flow. If you remember that the hitch is best avoided by keeping along the roof of the urethra, and overcome by elevating or rather drawing up the point of your instrument, difficulty need not be anticipated. In cases of difficult catheterism, the finger in the rectum not only is sometimes the means of rendering valuable assistance, but it also serves the purpose of verifying the

position of the instrument before harm is done. It should not be forgotten that in cases where there may be doubt as to whether the catheter has reached the bladder, assuming it to be empty, we ought to feel the prostate well below the line of the instrument. It is almost impossible to make a false passage into the bladder above the prostate, or through it, unless it is much hypertrophied.

There is very considerable variety in the form and make of urethral bougies and catheters. Some you can shape for yourself according to your fancy, or in reference to the particular

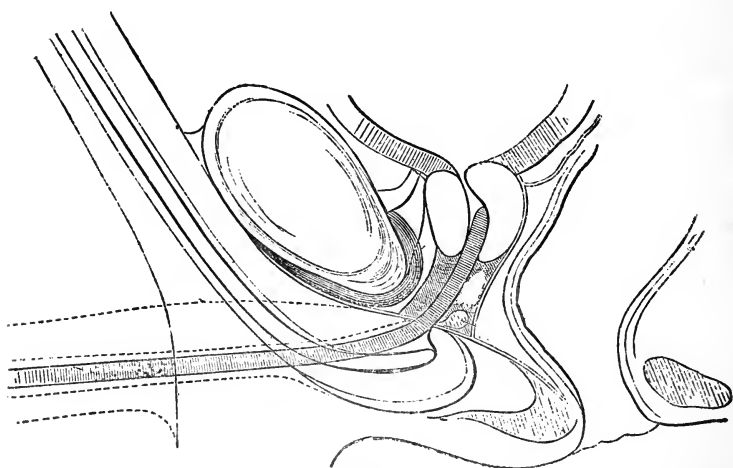


Fig. 8.

case, or even leave it to the urethra to mould; these include the gum-elastic instruments. Others, again, are made of silver, or some light metal, curved in accordance with the fashion prevalent in their day—fashion appearing, to some extent, to influence matters surgical as well as less important ones. Hence varieties in the curvature of metallic instruments are met with. I prefer the short curves, such as the Edinburgh instruments which are associated with the name of the late Professor Syme.

In the selection of urethral instruments, whether flexible or

metallic, and of what shape, though expressing my own preferences for the advantage of those whom it is my duty to teach, I would not wish to alter the practice of those who from long experience entertain different views on these points. There can be no doubt that habit in the use of one kind of urethral instrument is an important element of success in conducting these operations. I remember some years ago seeing a sailor on board ship in consultation with a most excellent Dutch surgeon, and the facile way he passed a metal catheter, which in shape more nearly resembled the long section of a gravy spoon than anything else I could liken it to, fairly astonished me. On the other hand, the look of curiosity with which my friend regarded the long, slender, whip bougies I was then introducing into practice, showed me that it was quite possible to attain the same ends but with somewhat different tools. Hence we must not deal too cavalierly with that dexterity which has been acquired by long use and practice, it is invaluable, though it may hardly correspond with what we think it right to teach beginners. And so about the position of patients about to be examined in this way, we have our individual preferences, but, with due regard to these, I have to teach students to be equally dexterous with the catheter whether the patient is erect or recumbent.

In referring to these manipulations with the catheter or bougie, it is hardly necessary to remark that all attempts at show or display must be deprecated as being outside the gravity of a surgical procedure. Simple as it may be, we never know when we may be brought face to face with a case which taxes to the utmost all our resources, and seems to set at naught our boasted dexterity. All such practices, as what used to be called the *tour de maître*, and attempts to acquire them, should be regarded as more akin with jugglery than scientific surgery. The surgeon who boasts that he has never failed to pass an instrument into the bladder is to be regarded with some suspicion; he, on the other hand, who quietly and unosten-

tationously does his best to give his patient the full benefit of his skill, and recognises the moment when the intended remedy becomes positively worse than the disease, is to be imitated, whatever his degree of dexterity with the catheter may be. Not only is it necessary that you should make yourself fully acquainted with all the details of catheterism, and of the various kinds of instruments employed, for your own success as an operator, but also for the purpose of instructing others in the art. As a large proportion of males can only continue their existence by the use of the catheter, their comfort is relative to the success with which they can conduct this daily operation, and any hitch that may occur is apt to be followed by symptoms of a pressing nature. Hence no pains must be spared in selecting the instrument appropriate to each case, and in instructing as to the manner of using it. To hand this business over to the mechanician is, I think, a mistake.

When a surgeon undertakes the treatment of a presumed case of stricture, it will be necessary for him to *explore* the urethra, and, in doing this, he should endeavour to obtain the greatest amount of information with the least amount of pain and distress to his patient. It is my belief that the instrument which best enables us to fulfil these conditions is the bougie, with the end slightly bulbous to facilitate its introduction. They are made both of flexible material and of metal. If a surgeon cannot by these obtain all the information he requires about the urethra, I am sure he will not be assisted by any of the bulb or olive-headed instruments which are vaunted for this purpose. It is a matter of touch and of handling. What is wanted is the *tactus eruditus*—the acquisition of which requires quite as much practice as is needed to detect fluctuation. To the unpractised hand, the whole length of the urethra is a stricture, which no form of instrument renders otherwise.

For the dilatation of strictures a more conical instrument is better, as it does its work on the principle of the wedge; for this purpose you generally see me employ the bougie-à-boule

(Figure 9). In selection, "preference should be given to such instruments as are rather stiff, but have a long, slender, flexible neck supporting the bulb. When held vertically, bulb upper-

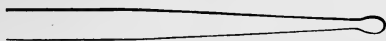


Fig. 9.

most, and touched upon the olivary tip, the neck should yield at once. Such an instrument will guide itself safely, and override obstruction. The olivary points found on the English



Fig. 10.

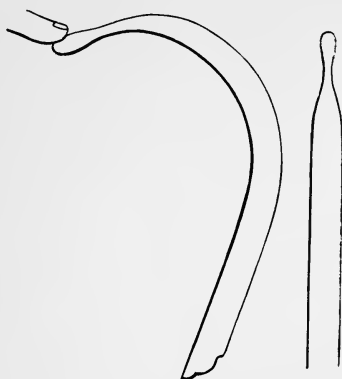


Fig. 11.

conical bougie are useless as far as any advantage derived from the bulb is concerned, from a neglect to make the neck of the instrument flexible." \*

You have also seen me use with advantage, in tight, tortuous strictures, cone-shaped bougies (Figure 12) without

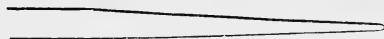


Fig. 12.

the bulb; these, however, are rather apt to hitch in the lacunæ of the urethra, and, consequently, are not so easily passed as the bulbous-headed instrument.

\* *Genito-Urinary Diseases*. Van Buren and Keyes, p. 107.

The whip bougie is an exceedingly useful instrument in a variety of urinary disorders, and in combination with the silk catheter, as will be described, should find a place in every practitioner's bag. It may be used for the dilatation of stricture, for retention, and for difficult catheterism where the enlarged prostate renders the passage to the bladder tortuous.

It was first described by me about four years ago,\* since which time it has been largely and generally used. It consists of a finely-tapering bougie, about twenty inches in length, which as it is introduced curls up within the bladder until the necessary degree of dilatation of the stricture has been obtained. Thus the urethra can be dilated when strictured to three or four sizes with only one introduction of an instrument, an important point where the difficulty of the case lies in passing the obstruction at all. By slipping a piece of tubing or a silk catheter open at the end over it, it will be found useful as a flexible guiding stylet in cases of retention due to prostatic enlargement where the canal has been rendered unusually tortuous. For self-catheterism, where there is a little hitch at the neck of the bladder from an enlarging prostate, or where catheterism has to be left to a nurse or an attendant, when the actual calibre of the urethra is not diminished, it will be found to answer well.

More recently I have used these whips for assisting in the demonstration of small fistulous communications between the bladder and intestines. In one instance I was able to afford proof that the instrument had passed from the bladder into the bowel. I have no doubt that in some of these comparatively rare and difficult cases an additional means of establishing a diagnosis will in this way be provided.† I must not here omit to mention the fine capillary catheters of Dr. Ward Cousins, which may be insinuated through the smallest and most tortuous strictures in the same way as the whip bougies.

\* *The Lancet*, Feb. 3, 1883.

† These instruments have been made for me by Mr. Wood, 81, Church Street, Liverpool, and by Messrs. Tiemann, of New York.

There is another form of pliable bougie which you will find very useful in the treatment of tight strictures ; I allude to the whalebone filiform bougie. With care and patience it can be insinuated through the finest and most tortuous canal. The direct dilating power you can exercise upon a stricture is certainly not great ; indirectly, however, the instrument is of service, and, after one or two trials, increased sizes may be made to follow.\*

There is an adaptation of the filiform bougie which is not so well known as it ought to be, as in the treatment of the worst forms of stricture its use is invaluable. I refer to the tunneled bougies and catheters of Dr. Gouley, of New York, which excited much interest when I showed them here and illustrated their use in several cases representing stricture in its worst form. The following are abstracts of two of the cases referred to :—

CASE I.—On June 27th, 1878, J. P., aged 27, was admitted into the Royal Infirmary suffering from stricture of several years' duration. On this, as well as on a previous occasion, it was found necessary by my house-surgeon, Mr. Hodgson, to tap the bladder above the pubes with the aspirator. This gave immediate relief. Two days after his admission the patient again had retention whilst I happened to be in the Infirmary. I succeeded in passing one of the finest filiform bougies, and upon this a tunneled catheter, which was retained for some hours ; from this date, dilatation upon the same principle was gradually commenced, the size of the tunneled instrument being increased from time to time until a No. 9 ordinary bougie passed easily when the patient left the hospital.

CASE II.—J. W., aged 60, was admitted under my care on June 12th, 1878. Thirty years previously he had a fall on his perinæum, rupturing his urethra, for which perineal section was successfully performed by Dr. Evans of Belper. Unfortunately, the patient does not appear to have followed up the treatment of his own case by that regular introduction of bougies which in all cases of traumatic stric-

\* A very full description of these instruments will be found in a paper entitled " Filiform Bougies, their Uses and Advantages," by Dr. J. C. O. Will, *Edinburgh Medical Journal*, April, 1877.

ture is absolutely necessary, and occasional attacks of retention were the natural consequence. As I expected, I found a very tight stricture, which would only admit a filiform bougie. Upon this a tunneled bougie was passed, and dilatation continued until a Holt's instrument could be introduced. On several subsequent occasions I passed this instrument, using it as a dilator on the principle of a glove-stretcher; by these means the dimensions of the urethra were soon enlarged, and the patient was able to leave the Infirmary passing urine in a good stream.

The tunneled bougie and catheter consists of, first, a fine filiform whalebone bougie, which acts as a guide; and, second, a catheter or bougie, perforated at the end, so as to run on the guide. To use the instrument the guide is first passed through the stricture into the bladder. I hardly like speaking quite positively, but I feel very much disposed to say that this can always be done. These instruments are so fine that it is no use oiling them; you must lubricate the urethra first by injecting some olive oil. In using them remember what I said about strictures being eccentric with the opening, not in the axis of the urethra, but, so to speak, in a corner; therefore, when you meet with difficulty in passing them, slightly bend their tips and introduce them with a rotatory movement, twizzling them, in fact, between the finger and thumb when the stricture is reached. If you feel satisfied from their fixity that they have entered either a false passage or a lacuna, do not withdraw them, but pass another; if you have stopped up one gap, the next you introduce is so much the more likely to find its way into and through the stricture. You have seen me with five of these small bougies in the urethra at once, all simply serving to fill up lacunæ and old false routes; and then the sixth, having nowhere else to go, readily passes through the stricture and enters the bladder. About the latter result you can have no doubt when it is accomplished; the feel is quite unlike anything else, and a little practice soon teaches you this. These instruments, though so fine, are very tenacious, and you need

have but little fear of their giving way.\* On threading the bougie or catheter on to the guide, run the former slowly along the guide until the stricture is reached. Keeping to your guide, should the stricture feel hard or firm, you will be able to exercise more pressure with your instrument to overcome the stricture than you would otherwise like to do. In commenting upon my remarks at the British Medical Association, Mr. Lund drew attention to an objection that can be raised to the use of these instruments—viz., that, on passing the metallic bougie along the whalebone guide, unless care is taken, the bougie is apt, on reaching the stricture, to double up on the guide, and then, if force is exercised, a false route may unintentionally be made.

Short of failing to introduce the guide, this is the only accident that is likely to occur in the use of these instruments. (Fig. 13).† It does not, in my opinion, detract from their efficacy, inasmuch as I can hardly imagine any surgical instrument being made without requiring in its use that skill and knowledge which can only be acquired by experience and observation. I admit the propriety of Mr. Lund's comment, and record it as a point to be remembered. I have described these instruments very



Fig. 13.

\* Mr. Teevan records a case of a whalebone guide breaking where much force had to be applied. No ill results followed. (*Lancet*, Feb. 7, 1874.)

† These instruments are made for me, after the model of Dr. Gouley's, by Mr. Wood, 81, Church-street, Liverpool.

fully, as I am sure they have only to be more generally known to be appreciated.

Though I believe you will generally find flexible instruments suitable, you will meet with cases where, with all your dexterity and patience, either from the hardness or tenacity of the stricture, or from the existence of a false passage, a flexible instrument will not pass. You will then resort to bougies made of metal. Let me give you one caution in reference to them. The smaller-sized instruments, unless used with delicacy, may occasion a considerable amount of damage, as, by a very little pressure, they may be made to work their way out of the urethra. I showed a specimen, some years ago, at the Medical Society, where, in the hands of an experienced operator, a fine metallic bougie had been made to leave the urethra in front of, and to re-enter it behind, a hard stricture.

The metallic instruments generally in use are of an uniform diameter throughout, the end being slightly rounded to facilitate introduction. There is an extremely useful variety, in which the principle of the wedge is introduced, the instruments being so made as gradually to increase in size from the tip to the curve. The four I have in use are thus arranged: the first represents on the curve, 1 to 3; the second, 4 to 6; the third, 7 to 9; and the fourth, 10 to 12. It must be remembered that these four bougies represent a very considerable amount of dilating power, and are to be employed with caution.

With the instruments I have now brought under your notice, provided you will learn how to use them, I do not think you will meet with difficulty, either in detecting strictures or dilating them when necessary. There are one or two points of which I should like to remind you. In the first place, take care that the instrument you use is smooth, warmed, and well lubricated. For the last purpose I often employ castor oil in preference to anything else. Being more viscid than other oils, it is not so easily rubbed off by the first portion of the urethra, Finely carbolized vaseline is an excellent lubricant, and is much

used for urethral purposes by some practitioners. In using small instruments, which will not carry much grease on their surface, it is a good plan to inject the urethra with oil before attempting to pass them.

Take care that all instruments passed up the urethra are most scrupulously clean. You would not like to convey bacteria, or other such-like noxious agents, into the bladder; hence a carbolized oil may be advantageously employed. There is no doubt that cystitis has been provoked by unclean instruments. I once heard of a practitioner being threatened by a patient with an action for damages for giving him a gonorrhœa by the use of a dirty bougie. On more serious reflection, the person came to the conclusion that he might have some difficulty in sustaining his case; he therefore told me, after consulting me as to the probability of success, that being a married man he thought, under the circumstances, it would be more expedient to desist. I agreed with him.

In the employment of gradual dilatation, avoid inducing anything like extreme tension. There is nothing so repugnant to the tissues as tension, or which they are more apt to resent. I have seen a case of gradual dilatation delayed for weeks by a neglect of this precaution. In using bougies, then, in increasing sizes, stop short of the one you feel sure may be passed, but will be a very tight fit. Proceed cautiously, let a few days elapse, and you will find that, on the next occasion, the size which would have required some force now passes readily.

The frequency with which dilatation should be practised must entirely depend on the tolerance of the patient. In some it should be done daily, or even twice a day; whilst in others, two or three days must elapse between each application.

In the employment of flexible instruments particularly, I should advise you to measure them with a gauge, and to work systematically from this. These instruments often vary, and do not correspond with the numbers marked upon them. I prefer the French gauge, as the increase in size is much more gradual

than that adopted in England. I make use of a catheter gauge I first saw employed in America, and which is preferable to others, not only on account of its more convenient construction, but because it combines in one instrument the various systems which are used for gauging urethral instruments. (Fig. 14.)

I find the English gauge is too abrupt for many strictures requiring dilatation by bougies. To remedy this, Mr. Young, of Edinburgh, has made me a set of Syme's short curved bougies, with an intermediate size introduced between each English numeral. By this plan I have twenty-four bougies to make up my twelve numbers. They are numbered as follows:  $\frac{1}{2}$ , 1,  $1\frac{1}{2}$ , 2, and so on, up to 12. It is better to adopt this method of noting the sizes than to propose to alter the numerals. We are all accustomed to the English gauge, and if a bougie is referred to as being, we will say,  $8\frac{1}{2}$  English, we know at once the size, and that it is intermediate between an 8 and a 9. No. 15, which is the equivalent to an English  $8\frac{1}{2}$ , in the French system of marking urethral instruments, would not be so familiar to us in this country. It is

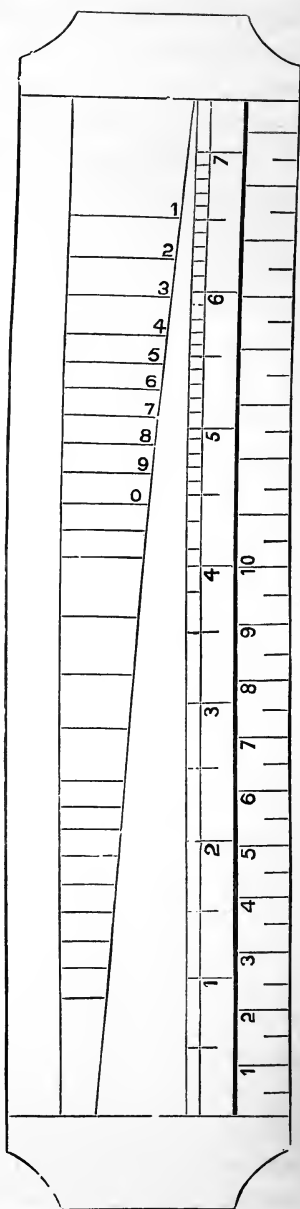


Fig. 14.

not important to have catheters graduated so finely as this, as a smaller size will always do service for a tighter fit. With bougies it is our object to pass, almost imperceptibly, to increasing diameters.

The degree to which dilatation should be practised is a point of much importance. The English make of instruments usually determines No. 12 as the limit. I prefer, as a rule, three or four sizes above this. To avoid the meatus being kept on the stretch the whole time the instrument is being passed, I have my own bougies, above No. 10, made to diminish from the curve towards the handle. When we consider that in the employment of gradual dilatation we get little more than the stretching of the urethra, it is a matter of importance to ensure that the stricture is sufficiently stretched; and this, in the majority of instances, is not accomplished by the English No. 12 bougie. Harm is often done by passing bougies down to the face of a stricture without fairly entering it; in this way a pouch may be made which rather adds to future difficulties that may arise.

When practicable, instruct your patient how to pass a bougie for himself, as all modes of treatment require the occasional use of the instrument; and this, when he is properly educated, may generally be left to the patient, after the urethra has once been sufficiently dilated. In the case of gum-elastic bougies, it is well to caution the patient against retaining them in their service too long; they are apt to become brittle, and are then, of course, dangerous.

To patients who are very intolerant of catheterism, or in whom there is difficulty from spasm, in passing an instrument, an anæsthetic may be administered with advantage. As a rule, for these cases, I prefer chloroform to ether, as, with the latter, the stage of excitement is usually more prolonged, a point worthy of consideration where we have a distended bladder. I mention this, as I prefer, for surgical operations generally, ether to chloroform.

And now it will be proper to ask what we may expect from treatment by gradual dilatation. In the earlier forms of stricture, where the obstruction is cellular rather than fibrous, you will find that the introduction of the bougie exercises a healthy stimulus on the part, and leads to the removal of the effusion producing the obstruction. In advanced stricture, where the adventitious deposit has been allowed to become cicatricial or indurated, I fear dilatation will do no more than dilate. You can stretch the narrowed urethra to a size corresponding with the natural dimensions of the canal, and, in the great majority of instances, by a moderate amount of care and persistence in treatment, you can keep it so stretched, but I have not been able to infer or to demonstrate that absorption, under these circumstances, actually takes place. The absorption which may have been observed to follow is to be attributed to the stimulating effect produced upon the urethra by the passage through it of what can only be regarded as a foreign body. We all know that pressure does produce absorption, but in order that it may so act, it must be continuous, and not interrupted. I may conclude my remarks upon treatment by gradual dilatation by observing that it is adapted to all strictures of recent date, and to those more advanced where the process of dilatation is not intolerable to the patient, and where, subsequently, the dilated condition may be sustained with a moderate amount of care.

I will now pass on to notice the treatment of stricture by what is called continuous dilatation, a method which possesses some very decided advantages. It is based upon the observation that when a bougie is retained within a stricture sufficiently long to set up inflammatory action, the stricture yields, so that within forty-eight hours or so a bougie several sizes larger may be readily passed: by the extension of this principle, dilatation, even of the tightest stricture, may be very speedily accomplished. Hence it is well adapted to tight strictures where catheterism is attended with more than ordinary diffi-

culty. In gradual dilatation, the temporary pressure of the bougie stretches the stricture, and the stretching may, in favourable cases, be carried to such an extent as, in a great measure, to deprive the stricture of its contractile power; just as the frequent stretching of an elastic material, such as an india-rubber band, weakens its contractile, or rather recoiling, power. In continuous dilatation limited inflammation of the urethra is excited, under the influence of which the stricture material softens down, so as to render the canal readily dilatable.

To carry out this treatment, a gum-elastic catheter is introduced, and retained by some suitable contrivance. A convenient way of keeping a catheter in this position is by a ring passed over the penis and secured to the body, the end of the catheter being attached to the ring. I see that Mr. Furneaux Jordan prefers a bougie to a catheter for this purpose, the advantages of the former being—"a more rapid and complete dilatation, due to the hydrostatic pressure of the urine along the exterior of the bougie. A bougie is more easily introduced than a catheter. When the finest bougie is once in, it need not be taken out—no slight boon; the ordinary acts of micturition are preserved; every kind of apparatus for keeping the bed dry, or for any other purpose, may be dispensed with."\* I have found a fine bougie—for instance, the filiform—answer all the advantages claimed for it by Mr. Jordan.

There is a little device I sometimes employ, on the principle just mentioned, which will be found of service in opening up fine strictures and preparing them for ordinary dilatation. I often practise it and it has the advantage of not confining patients to the house. It consists in passing the finest catgut bougie into the bladder, and then securing it by a piece of plaster, and a finger bandage wound round the penis, and made to include the ends of a silk noose which retains it in position. The patient passes water by the side of the catgut; as a rule,

\* *Lancet*, January 29th, 1876.

it causes him no inconvenience, and at the end of forty-eight hours it can be withdrawn. At the end of this time, the stricture is sufficiently dilated to admit a larger instrument, and then gradual dilatation can be proceeded with. Of course, if the patient cannot micturate with it in, it must be withdrawn. The same object, however, may be obtained by teaching the patient how to introduce it, and instructing him to keep it in a few hours daily. In some cases of tight stricture, it is found impossible to introduce a flexible instrument. The ordinary metallic catheter answers the purpose equally well, though it is not so comfortable for the patient, as it necessarily restricts his movements much more.

The instrument being introduced, you should retain it until it moves with complete freedom. This occupies usually from forty-eight to seventy-two hours, and is attended with varying degrees of local inflammation. When the instrument is changed, a larger one is substituted, and in this way a tight stricture may be fully dilated in the course of a few days. There are two precautions which I would repeat. First, the instrument must not fit the stricture too tightly. Nature invariably resists tension. Second, the end of the instrument should only be just within the bladder. If it exceeds this, it is pretty sure to act as an irritant to the bladder; and an attack of cystitis is of course to be avoided. I have never seen any serious symptom occasioned to the bladder or adjacent parts by the retention of a soft bougie within the urethra, but I have known perforation and peritonitis follow the prolonged retention of a metal catheter.

It is my practice to have the temperature noted when treating a patient by continuous dilatation; a rapid rise in the thermometer indicates that the instrument should at once be withdrawn. Experience has shown me that this is a precaution which should not be neglected. If the kidneys are not sound, this "suppurative process" of treatment will not be tolerated. To soothe the restlessness which the restrained position some-

times occasions, I am in the habit of administering morphia in small doses at regular intervals.

In estimating the value of continuous dilatation, I have found its results compare favourably with those obtained by the gradual method. In the latter, it is only in the early stages of the disease that absorption is obviously promoted; in the later stages the stricture is merely stretched to the desired extent. In continuous dilatation I believe that not only is absorption promoted, but what is left behind of the stricture-material is less disposed to contract again.

It we could by any means, chemical or otherwise, deprive the scar-tissue, of which strictures are composed, of its tendency to contract, we should effect more for the treatment of stricture than any of the purely mechanical devices have yet done. The prosecution to a successful issue of the inquiry, By what means can scar-tissue be more nearly assimilated to healthy tissue and be deprived of its contractility? would prove of service to surgery generally, and especially to this branch of it. This is a topic which will be again referred to when I come to speak of the prevention of stricture, and its treatment by combined internal and external urethrotomy.

Working in this direction some years ago, I published a paper in which I referred to some advantages I had found in the use of belladonna as a topical application to stricture.\*

As expressing views which a more extended experience has confirmed, I will quote from the article alluded to. "As a topical application, I have used it (belladonna) with benefit in some of the more obstinate forms of stricture, especially those consequent on injuries of the urethra.

"Referring back, we find some of the surgeons of the last century strongly recommending it, where spasm was present, to produce relaxation; but as we are now provided with remedies

\* "The Therapeutic value of Belladonna in some Diseases of the Bladder and Urethra." By Reginald Harrison. *Liverpool Medical and Surgical Reports*, 1868.

more certain in their action for combating this complication, this drug has naturally fallen into disuse.

“It is not, however, to any anti-spasmodic influence it may possess that I purpose to allude, but to the power which I believe it has of directly influencing and effecting a change in the obstructing material. I was first induced to give it a trial in these cases by observing the benefit that followed its application to cicatrices and growths of a fibrous character resembling them; in one instance, especially, an unsightly deformity on a young woman’s forehead, the constant application of the extract of belladonna produced a very decided effect; the cicatrix, though not disappearing, became much softer, more like the healthy skin around it, but what was of still more consequence, it lost almost entirely the disposition to contract, which is productive of such painful deformities. I have used it with undoubted advantage in other cases, and I therefore had reason for anticipating an equal benefit from its application to internal cicatrices that gave rise to inconvenience. Of these, the most distressing and obstinate is the stricture following injury to the urethra. It may be dilated very often, readily, but soon returns unless constantly under supervision. Dilatation simply *stretches* the cicatrix without in any way depriving it of that contractile power which is the essence of the disorder. Some patients may be instructed how to introduce an instrument for themselves, but this, for obvious reasons, is not of universal application. Others may be permanently relieved by proceedings of a more strictly operative character, and with comparatively little danger, but from them we find they sometimes shrink. It is to meet such cases that I would suggest the use of belladonna.

“The most convenient way of applying it is with the oleum theobromæ, which is sufficiently hard at ordinary temperatures to permit of its ready introduction into the urethra. I generally recommend two grains of the extract of belladonna to be used in this way twice a day, in conjunction with dilatation by bougies; the belladonna should be persevered in after the

bougies have been discontinued. Very great, and I believe permanent, benefit has resulted from this plan of proceeding, and in cases where the bougie treatment alone had previously only effected a temporary relief. I may also add that my observation is confirmed by others who have given this plan a trial."

It is in furtherance of this object that electricity is now being applied in the treatment of stricture, how far it will succeed yet remains, I think, to be seen.

Excision of a stricture has been practised with success.\* I hardly think, however, that this treatment will be much resorted to.

Those who are curious in regard to the many different ways that have been suggested for the treatment of stricture and retention, will find interest in reading how hydraulic pressure and the pressure of air, including suction, have been employed for this purpose.† The possibility of dilating a stricture by air is referred to by Dr. Kerrison as having been utilized by the Egyptians in very primitive days for the purpose of removing stones from the bladder.‡ I merely refer to such suggestions and practices to say that in the case of stricture they are quite inapplicable, as their tendency, as well as that of all other forms of indiscriminate pressure, is to dilate the most yielding portion of the urethra, and that certainly is not the point where it is strictured.

The dilatation of stricture is usually effected by the introduction of instruments from before backwards; exception to this are exceedingly few. I have elsewhere alluded to Mr. Furneaux Jordan's suggestion, that advantage may be taken of

\* A. W. M. Robson, *Brit. Med. Journal*, vol. i, 1885.

† *Medical Record*. February, 1878. *Gazette Hebdomadaire*, No. 32, 1872. *British Medical Journal*, October 27, 1877. "Employment of Suction," by Dr. O'Connell, *Lancet*, March 2, 1872.

‡ "On the Dilatation of the Male Urethra by Inflation for Extraction of Calculi from the Bladder, as practised in Egypt near 250 years ago," by R. M. Kerrison, M.D.—*Med. Chir. Trans.*, vol. xii.

the dilated condition of the urethra behind a stricture to reverse this order of proceeding, and pass the instrument from the bladder side of the obstruction towards the meatus urinarius; this Mr. Jordan has effected by an incision through the rectum.

Some cases are recorded by the late Mr. Callender and by Mr. Howse,\* of stricture treated by the aid of supra-pubic incision into the bladder. The circumstances that would render such operation desirable are so exceedingly rare that I refer to them here rather as being surgical curiosities, than as commending this procedure so long as it is possible to attack a stricture from the front. As I have never met with a case where this has not been possible, and therefore have had no opportunity of demonstrating to you the operation of supra-pubic incision into the bladder under these circumstances, I will here only caution you against making such incisions, either for strictures or for stone, unless no other course is open. In Mr. Jonathan Hutchinson's case† of supra-pubic lithotomy, the constant welling up of urine through the wound occasioned a trouble which was not by any means exceptional. Mr. W. Thomas reports a case‡ where, to remedy a congenital malformation of the urethra in a child, he explored the obstructed canal from the bladder side by means of a supra-pubic cystotomy. I saw a man at Dr. Gouley's clinique at Bellevue Hospital, New York, who had stabbed himself above the pubes for the purpose of relieving his retention. There seemed every prospect of the opening tending to become permanent.

The use of caustics in the treatment of stricture, which was in vogue at the commencement of the present century, has now been almost entirely abandoned. I have occasionally used a weak solution of nitrate of silver to an hæmorrhagic stricture, just as I would do to a florid granulation, with the object

\* *Clinical Society's Transactions*, vol. xii. "Concerning the Operation of John Hunter in certain cases of Impassable Stricture (Supra-pubic Operation)." Dr. McDougall.—*Edin. Med. Journal*, 1879.

† *Clinical Society's Transactions*, vol. xii.

‡ *The Lancet*, Aug. 21, 1886.

of diminishing its tendency to bleed on the slightest occasion. To apply caustic as formerly, for the purpose of destroying or burning out a stricture, is quite at variance with the better principles of the present day.

Hæmorrhage from the urethra is not an infrequent consequence of catheterism. When slight, it need not occasion any anxiety. In cases of granular urethritis it is difficult sometimes to pass an instrument without rupturing some of the minute bloodvessels, which, in this state, remain in a highly congested condition. I saw, not long ago, in consultation, a case of hæmorrhage from the urethra, after catheterism, of an unusually persistent character. So exhausted was the patient that it became a question whether it would not be necessary to lay open the perinæum, and expose the urethra at the place where it was supposed to be injured. Before seriously entertaining this proposition, I suggested that the subcutaneous injection of ergotine should be tried. After two injections the hæmorrhage entirely ceased. This patient appeared to have come from a family of "bleeders," a brother and a sister having died from persistent hæmorrhage following trivial injuries. I have elsewhere illustrated the value of matico as a hæmostatic. When the hæmorrhage is free and continuous, there is reason to believe that some laceration has been occasioned to the walls of the urethra, and that a false passage has been made. The damage that is inflicted in this way is sometimes very extensive. Not long ago, there was, in my ward, a case in which I had unusual difficulty in passing a catheter for urgent retention of urine, in consequence of a false passage opening into the rectum, which had been made a few hours previously by a notorious secret-disease quack. After I had once succeeded in relieving the bladder, no further catheterism was necessary, and I delayed the passing of bougies for a fortnight. Fortunately, by this time, the false passage had closed, and treatment was proceeded with as usual.

When a false passage is made, it is usually along the floor

of the urethra, the operator allowing the point of his instrument to drop, and then, when a hitch occurs, as the more fixed portion of the urethra is reached, exercising force. Now, as the deeper portion of the urethra can be readily explored by the finger in the rectum, whenever difficulty arises here, or there is reason to believe that the instrument has deviated from its proper course, this means of assistance should not be forgotten. For, with the finger in the rectum, the hitch may be overcome, or the wrong position of the instrument detected.

When a false passage has been made, it is better to suspend further instrumental treatment for some days; there is but little risk of extravasation of urine occurring, as the direction of the laceration is contrary to that of the stream of urine. On resuming treatment, care will have to be taken to avoid the site of the false passage, as by repeatedly opening it up, it may be converted into a sinus. As I have already stated, false passages are usually made in the floor of the urethra. I pointed out an exception to this in the case of a patient who had an old false passage leading from the upper wall of his urethra; this, however, was so far satisfactorily explained to me as having been caused by the patient in using an instrument like a stylet, which he occasionally employed at sea whenever he considered that his stricture required "breaking down." I could pass a small elastic bougie into the false route, whilst another, at the same time, could be made to traverse the stricture into the bladder. This case was satisfactorily treated by rapid divulsion.

The good to which a false passage may occasionally be turned is well illustrated in the following interesting record I had from my friend, Mr. Cadge, *apropos* of another subject upon which I sought his opinion:—

CASE.—As to the tolerance of instruments, even in an artificial canal, I may mention a *post-mortem* I recently made on a man who for five years had worn a No. 12 flexible rubber catheter day and night, and had gone about and transacted professional business fairly.

He had an old stricture which nobody here or in London could get through. Forcible catheterization was adopted ; No. 12 was gradually passed, but it could never be left off, for the water came no better, and a perineal fistula never healed. When he died, I found that the catheter had gone not through but alongside the stricture, and, instead of entering the urethra behind the stricture, had bored a hole through the prostate, and made a separate aperture into the bladder. This false canal answered well, and was lined by a polished membrane.

## SIXTH LECTURE.

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### ON TOXIC URINE IN RELATION TO CERTAIN SURGICAL OPERATIONS ON THE URINARY ORGANS—URINARY FEVERS—TREATMENT.

It is impossible to study a series of cases of internal urethrotomy without recognising that, apart from their surgical interest, they may be regarded as extremely valuable physiological experiments in relation to some unworked-out problems connected with animal chemistry. Until quite recently it may be said that certain events, following upon interference with the male urethra, proved little else than material for speculation, but little light being thrown upon what we have been accustomed to speak of somewhat vaguely as urinary fevers.

Some valuable communications have, however, from time to time been made in reference to this subject generally. Amongst these I would particularly mention one by my colleague, Mr. Mitchell Banks.\* A careful study of this paper led me to alter materially my practice relating to the treatment of certain strictures of the urethra, and eventually brought about some modifications in my proceedings, which I venture to believe have an important bearing upon the remarks I am now making. Though the conclusions I have arrived at do not entirely correspond with those contained in the paper just referred to, I have no hesitation in expressing my indebtedness to the author for placing the matter before us in such a light as to furnish material for further elaboration and suggestion. It is now nearly fifteen years since, after practising the operation of internal urethrotomy on a tolerably large scale much as

\* *Edinburgh Medical Journal*, June, 1871.

now employed, that I practically abandoned it. I have again resorted to it within the last four years, performing it, however, in a different manner, and under circumstances distinguishing it, I believe, widely from my previous custom. For the purposes of comparison and deduction, I will briefly refer to the conclusions drawn from the two different methods of performing internal urethrotomy here referred to. The old practice of introducing some form of concealed knife within the urethra, and dividing the stricture by an incision, is almost invariably followed at an interval of somewhere about three hours with a rigor, and the subsequent development of more or less constitutional fever or pyrexia; these attacks may or may not be repeated at varying intervals; they differ widely in degree, in some instances being extremely mild, whilst in others they may prove severe or even fatal in a few hours. These phenomena have been explained in various ways, but none appeared to me to be satisfactory. That such symptoms have little or nothing to do directly with the pathological state of the kidney is clear, from the fact that they have been observed and have terminated fatally in individuals whose kidneys were *sans reproche*. That the state of these organs may, under certain circumstances, determine the degree, or even direction of the pyrexial attack may not be improbable, but that it can cause it or even be responsible for it is obviously opposed to observation. That such effects are due to any form of direct nerve lesion or nerve traumatism of any kind seems to me to be equally improbable. Injuries to nerves are immediately followed by such anatomical or physiological signs as the nature of the lesion is capable of affording. If a man's brain or spinal cord is damaged by a blow or shock, he shows signs of concussion or nerve traumatism immediately upon the receipt of the injury, and not three or four hours afterwards. Again, if it is a nerve lesion of the urethra which is the primary cause of the phenomena following, why do we not see urethral fever after far more extensive nerve injuries, such as lithotomy and other equally great operations

on the urinary apparatus? The improbability of urethral fever after internal urethrotomy, catheterism, and such like, being due directly to nerve shock, is indicated by other collateral considerations which may be noticed. In the first place, we should expect such symptoms to follow Holt's operation for stricture just as frequently and as severely as after section of the stricture from within. On the contrary, rigors and fever are far less commonly met with after dilatation with rupture than after internal urethrotomy—tearing or stretching is considerably less productive of urinary pyrexia than incision. In the next place, the position of the wound in internal urethrotomy, relatively to the circumference of any given part of the urethra, should hardly be expected to exercise a sort of determining influence in the production of rigors and fever, if the causation of these effects was a nerve lesion. Yet we find such symptoms more frequently follow when the section is made on the floor of the urethra in preference to the roof. A dependent position of the urethral wound is more likely to be associated with fever than one not so situated. Lastly, we should hardly expect the manifestation of these symptoms to be influenced by mechanical after-treatment if damage done to the local nerves was the cause of the symptoms that followed. Yet an analysis of cases seems to show that, when a catheter is worn for a time immediately after the internal urethrotomy, and bladder drainage of urine is carefully carried out, a considerable proportion of these instances escape attacks of urethral fever. As I have already remarked, if these effects are the result of nerve lesions, how is it we do not see them following lithotomy and properly performed perineal sections for urethral stricture? In reference to the latter operation, the earlier experience of Syme only shows how easy it is to construct a perineal section which proves to be just as ready a cause for rigors and fever as any internal urethrotomy. In looking over the notes of my earlier cases of internal urethrotomy, it struck me, as being worthy of remark, that neither rigors nor fever showed themselves until

after micturition had been naturally practised, or there was evidence that urine had found its way into the wounded urethra and was lodging there. This seemed to me to be opposed to the idea that nerve lesion had anything to do with the production of rigors and fever, inasmuch as these symptoms did not show themselves until urine had first been brought into contact with the wound. Such considerations as these led me to believe that the rigors and fever which I have referred to and illustrated by what follows internal urethrotomy, were symptomatic of poisoning rather than of shock. I therefore determined to test this point in practice, with the view at the same time of improving the condition of certain cases of stricture which proved unamenable to other means.

Adopting the view that rigors and fever, after internal urethrotomy and such-like operations, were illustrations of poisoning by material furnished directly from the urine, I resolved to perform a series of operations in suitable cases, where, though internal urethrotomy was practised, no urine was allowed to remain in contact with the freshly made wound. This involved an external perineal urethrotomy being done immediately after the stricture had been divided from within. In this way the urine was made to drain away just as rapidly as it was excreted. I published\* a series of cases, since added to, with comments, where the double proceeding had been practised, my object being not only to prevent urine lodging from decomposing, and becoming absorbed by the wound, but at the same time to permanently improve the condition of the stricture. From these operations of external and internal urethrotomy combined, I soon learnt how it was possible to produce rigors and fever at will after operations on the urethra. So long as the bladder drainage of urine through the external perineal wound was free and uninterrupted, there was invariably a complete absence of rigors and fever; if these conditions were

\* "On the Treatment of Urethral Stricture, by combining Internal and External Urethrotomy," *British Medical Journal*, July 18, 1885.

not fulfilled, either by reason of a flaw in the making of the drainage wound or in the apparatus used, I could see how such complications might arise. In carrying out these observations in regard to what I would speak of as the artificial production and prevention of rigors and urethral fever, I am particularly indebted to my house-surgeons in succession, viz., Messrs. Pearson, Dawson, and Collins.

At this stage of the question it seems important that we should clearly recognise the different conditions under which the surgeon has to deal with wounds which are exposed to the action or influence of urine. Running healthy urine may be regarded as absolutely innocuous. When it can make its way over a fresh cut surface, or out of a cavity, just as fast and uninterruptedly as it flows over or in, it need cause no apprehension; on the other hand, when it is pent up, as in a wound or space, it is apt to be speedily converted into a most destructive, and, I believe, poisonous agent. How favourable the conditions for the production of urine fever are those attending the operation by internal urethrotomy. The incision requisite for the division of the contraction necessarily paralyses the urethra to the extent, or rather more, of the wound that has been inflicted. Hence the process of repair has to be carried on with the wound soaked in the urine that is left behind to stagnate and to undergo change after each act of micturition. This is a very different condition from the incontinent flow of urine over the glazed and granulating open wound of a lithotomy or of a perineal section. In one case it is merely contact of urine with open spaces, in the other retention, and probably chemical rearrangement, within a space bounded by a freshly made wound. My direction and kind of work led me to believe some time ago that the urine could provide septic material of a kind which seemed to me to have been previously unappreciated in connection with the causation of urinary fever. It was with considerable interest that I perused the various communications bearing upon this subject which have been made by

Dr. Bouchard, of Paris. On a recent visit I had the pleasure of seeing many of Dr. Bouchard's experiments and tests, which he was good enough to show me at the Hospital Lariboisiere. These views relating to toxic urine, in conjunction with what I have stated as the result of my own observations in this department of practical surgery, seem to indicate tolerably clearly how poisonous normal urine may become, and how a grave complication may be added to a comparatively simple surgical procedure. I am much indebted to Dr. A. Barron for kindly making me the following digest of Dr. Bouchard's papers bearing upon this subject:—

In 1882, in a note\* presented to the Société de Biologie, Bouchard showed that alkaloidal substances were constantly present in the urine in certain infective disorders, and that these alkaloids were of intestinal origin; that is to say, that they were substances produced in the intestinal canal by the growth of the vegetable organisms therein contained, also that they were analogous to the *ptomaines*. Subsequently these alkaloids were found to be present in normal urine. Bouchard found the same alkaloids present in the *fæces*, and he divided them into two groups—(a) those soluble in ether, and (b) those soluble in chloroform. He found that, when present in large quantities in the *fæces*, they were also present in proportionally large amount in the urine, and this applied to the ether and chloroform groups respectively. This first paper may be summarised as follows:—

1. In health, alkaloids exist in the living subject.
2. These alkaloids arise in the intestinal canal through the action of putrefactive intestinal organisms.
3. The alkaloids of normal urine represent a fractional part of these intestinal alkaloids, absorbed by the intestinal mucous membrane, and excreted by the kidneys.
4. Diseases augmenting intestinal alkaloids augment *par consequence* the urinary.

\* "De l'origine intestinale de certains alkaloides normaux ou pathologiques," par Ch. Bouchard, *Rev. de Med.*, 1882, tom. ii, p. 825.

In his next paper\* he determined the effects of normal urine on rabbits, and found that the same doses produced different effects according as the individual furnishing the urine was in health or not; also that the *toxicity* varied in different individuals, that the symptoms depended on several distinct substances. He proved by experiment that the symptoms were not due to the water of the urine, nor to the urea, uric acid, creatin, salts, or volatile matters. Further, that the alkaloids soluble in alcohol differed in their effects from those insoluble in alcohol, and that, although there might be five or six different substances present, they could symptomatically be arranged in two groups, a convulsive and a narcotic, and he concluded that the symptoms in different cases of uræmia might be explained by these groups being present in the blood in varying proportions.

Quite recently Bouchard has brought forward some further facts with regard to the urinary alkaloids and their properties.† He defines a *toxie*, or a unit of poisonousness, as that amount of poison required to kill one kilogram of living matter, *e.g.*, of rabbit. The *urotoxie* is that quantity of urinary alkaloids capable of killing a rabbit weighing one kilogram. The symptoms of urinary toxæmia produced by introducing urine into the veins of a rabbit are, in the order of their occurrence—

1. Contraction of the pupil.
2. Acceleration and diminished amplitude of the respiratory movements.
3. Increase of urine.
4. Fall of temperature.
5. Diminution and finally abolition of reflexes.

\* "Recherches experimentales sur la toxicité des urines normales," *Comptes Rendus*, 6th Dec., 1884.

† "Sur les poisons qui existent normalement dans l'organisme et en particulier sur la toxicité Urinaire," *Gazette Hebdomadaire*, Avril, 1886; "Sur la variations de la toxicité urinaire pendant la veille et pendant la sommeil."

"Influence de l'abstinence, du travail musculaire, et de l'air comprimé sur la toxicité urinaire," *Gazette Hebdomadaire*, le 19 Mai, 1886.

6. Convulsions, usually with coma, and

7. Death; the action of the heart and the electro-contractility of the muscles persisting for a time after death. The fall in the temperature is due, not to increase in the loss of heat, but to a diminution in heat production. The urotoxic coefficient in man is  $\cdot 465$ ; in other words, for each kilogram of body-weight enough poison is excreted in twenty-four hours to kill  $\cdot 465$  grams of living matter, or in two days and four hours a man excretes enough to kill himself.

During eight hours, if asleep, only from one-quarter to one-half as much poison is excreted as during the same period when awake. If the whole day be divided into three periods of eight hours each, the proportional quantities of poison excreted are—sleep, 3; early waking period, 7; late waking period, 5. The urine of the sleeping and waking hours also differs qualitatively as well as quantitatively. The alkaloid of the urine of sleep is *convulsive*, that of the waking urine *narcotic*. The urinary poisons of the sleeping and waking hours are not only different, they are physiologically antagonistic.

Fasting increases the toxicity of the urine, probably because then the individual lives on his own tissues, and these are relatively more difficult of oxidation than the ordinary food, and are less completely oxidised. Labour greatly diminishes the toxicity of the urine, as does also the breathing of compressed air.

Opposed to the views I have advocated, that toxic urine is the cause of the rigors, and pyrexia, which constitute what we are accustomed to speak of as urine-fever, may be urged the following considerations. How is it that such symptoms are not produced when urine, often ammoniacal, is subcutaneously forced amongst the tissues, sometimes in large quantities, as in cases of stricture and sudden urinary extravasation? and secondly, how does it happen that the same symptoms have been produced in sufficient intensity to cause death within a few hours, where there is no evidence to show that the urethral

walls have been actually lacerated by the catheter or bougie, which is the assigned cause of the phenomena following? The latter considerations cannot fail to strike those who have perused Mr. Banks' paper, to which I have already referred. To each of these points I will briefly address myself.

The conditions attending subcutaneous urine extravasation are essentially different to those associated with the continuing contact of urine with a wound in the urethra, as in internal urethrotomy. A mixture of blood and urine seems to me to be capable of producing very different compounds from those that extravasated urine alone is likely to yield. Nor are we entirely to lay aside the consideration that, whatever *materies morbi* may be found at the seat of the wound by the conjoined decomposition of stagnant blood and urine, its entrance into the circulation must be favoured by the contractile power of the bladder from behind. Again, when urine is extravasated amongst the tissues, its action is that of a virulent local poison, under the influence of which the contiguous tissues are killed outright, probably before they can exercise any power of absorption. Such a conclusion seems likely from some of Menzel's experiments, where putrid and normal urines were subcutaneously injected into various parts of the body.

In reference to the second objection which may be urged, namely that cases are recorded which have proved rapidly fatal from urinary fever, where there is no evidence that the urethra has sustained any appreciable lesion. With all deference to those who think otherwise, I submit that this is a statement which should be received with considerable reservation. Though the operator is not conscious of having inflicted a lesion on the urinary passage with an instrument he has been using, nor the patient show evidence of it immediately, this by no means implies that a structural lesion on the urethra has not been inflicted. I have frequently drawn attention to this point, and demonstrated how readily false conclusions may be drawn in reference to it.

Curiously enough, it is not as a rule the most difficult cases of catheterism which are most liable to urinary fever; in those where structural damage is inflicted, or false passages made, they are generally on the distal side of the stricture, and consequently well protected from urine infiltration or contact.

I have seen a few cases where it has been found necessary to tap the bladder with the aspirator needle above the pubes. In some of these I have ascertained that this proceeding was not resorted to until after prolonged attempts to get in an instrument by the natural passage had been made, such efforts probably meaning that a considerable amount of damage in a legitimate way, had been done to the urethra, but in front of the stricture. In none of those cases where puncture of the bladder had to be subsequently performed could I discover that the patients suffered from urinary fever. Surely in these instances the amount of shock must be greater than that caused by the slight wound of a urethrotomy knife, where rigors and fever almost invariably follow.

As in connection with the whole subject of urinary pyrexia, I cannot deny that there are causes other than those proceeding from toxic urine, and clinically distinguishable from them, I would take the opportunity of briefly referring to them, as I have met them in practice.

In addition to the ordinary forms of fever, which may in some degree follow upon the infliction of any wound as in other parts of the body, as well as the extraordinary fever of the half-emptied septic-made bladder, about which we have recently heard so much in connection with catheter fever, there are two other forms of pyrexia which will in practice be met with. The one is essentially malarial, the other I would speak of as "irritative," for want of a better designation. The malarial variety is common enough in seaports. It is never seen except in persons who have had malaria, possibly at some very remote period of their lives, and is provoked by the passing of a bougie or a catheter. It comes on, as a rule, very shortly after the

operation, sometimes within a few minutes ; it bears no relation to the passing of urine ; it is amenable to ordinary treatment by quinine, and can, as a rule, be prevented by giving the patient a third of a grain of morphia subcutaneously an hour before the instrument is passed. Similarly, I have seen these attacks caused by the introduction of the finger up the rectum for the purpose of making a prostatic examination. I have never known febrile attacks of this description occasion any anxiety.

The variety of febricula, to which I have applied the term "irritative," for want of a better description, is hardly worth speaking of as a fever. It follows immediately upon the passing of an instrument ; the patient is conscious of chilliness, and there is some elevation in temperature, which speedily declines. Precisely the same occurs sometimes when a patient passes water along the whole length of the urethra for the first time after lithotomy ; this happened once to a patient of mine upon whom I had performed a prostatotomy on the first occasion he micturated naturally. In this latter instance it was more than a rigor ; it was a convulsive movement, which lasted for several minutes, and was followed by a rise in temperature. The patient subsequently told me that he believed all this was due to what he described as "the consciousness of a new sensation,"—he should rather have said that it was the revival of an old one after six weeks' absence.

In making these remarks I have endeavoured to apply my practical experience in the operative surgery of the urinary organs in the direction of throwing some further light on certain complications, which, though hitherto grouped under one name, permit, I believe, of further differentiation. We know a good deal relating to the chronic forms of urine poisoning ; of the acute much has yet to be learnt.

I desire to close these observations with a paragraph taken from the address, entitled "Medicine of the Future," which was

to have been delivered by Dr. Austin Flint, of New York, at the Annual Meeting of the British Medical Association, in 1886:—"Analytical Chemistry carries investigation beyond the limits of microscopical observation. The latter, at the present moment, both in pathology and physiology, seems to promise most; but is it not a rational anticipation to look for future results from chemical analysis of the components of the body, in health and disease, which in brilliancy and practical utility may surpass those of the labours in this field of investigation during the past half century? The medical semi-centenarian can recall the enthusiasm aroused by the labours of Liebig. Histology is now in the ascendant, but is it safe to predict that before the lapse of another half century there will be another era in organic chemistry, and that light will penetrate dark recesses which histology cannot reach? . . . The supreme objects of study in pathology at the present time are the discovery of micro-organisms and their natural history. But these agents it is probable are pathogenetic, not directly, but indirectly, by means of the toxical products of their activity. What are these products, and how do they give rise to the phenomena of disease? We may ask the same question of certain of the poisons introduced from without the body. How is it that fractional quantities of morphia, hyoscyamin, strychnia, aconitia, atropia, and other alkaloids produce their lethal effects? It conveys no adequate information to say that they act upon the nervous system. This is merely the statement of a fact, not an explanation. For the latter we must look to the organic chemistry of the future." Such is an anticipation by one who has been appropriately spoken of as "America's greatest physician," and whose loss to science and society is so sincerely deplored.

I should like to add a word or two about the treatment of those cases where catheterism is followed by rigors and serious symptoms indicating speedy dissolution. As I have urged, I believe the indications for treatment are those which would be

applicable to patients suffering from symptoms of urinary intoxication in its acutest form.

Persons who are suffering from kidney disorder, which is a frequent concomitant of stricture, are undoubtedly more liable to rigors and fever than those who are not. Such persons also feel the effects of shock much more acutely than others, and consequently, in these cases, we must limit any surgical interference to that which is absolutely necessary for the preservation of life, regardless of other considerations. We are again reminded of the importance of making a careful examination of the urine in all cases in which we are about to undertake the treatment of stricture. No cases are so much benefited by the observance of the medical and hygienic preliminaries usually employed with patients about to undergo a surgical operation as these, and, when circumstances are not pressing, they should not be dispensed with.\*

In the treatment of rigors and fever, I cannot but endorse the favourable opinion which has been expressed as to the efficacy of aconite and quinine. The former is often a prophylactic when administered in two-minim doses of Fleming's tincture immediately after catheterism, as first suggested by Mr. Long.† On the latter, reliance must be placed on the development of the symptoms.

The most serious aspect of urethral fever has reference to the state of the kidneys and the excretion of urine. In the slighter cases, there are no appreciable changes in the urine; but in the severer forms, it may be albuminous, sanguineous, or even completely suppressed. This symptom of suppression is best met by acting upon the skin, and arousing perspiration by the employment of vapour baths, or, where this cannot be done, by placing the patient for a few minutes in a hot bath,

\* "I prepare all cases—with the exception, of course, of urgent cases—for five or six days before they are placed under mechanical treatment, and consequently now have in my own practice but few cases of urethral fever to treat."  
—Gouley, *Diseases of the Urinary Organs*, p. 38.

† *Liverpool Med. Chir. Journal*, January, 1850.

and then enveloping him in blankets. Dry cupping over the kidneys may also be advantageously employed. For its diuretic action, Gouley recommends that a teaspoonful of the infusion of digitalis be given every hour or two, the effect on the circulation being closely watched. The infusion is preferred to the tincture or the extract, as being a more effective diuretic. Since seeing this observation by Gouley, I have tried digitalis in several cases of urinary suppression after catheterism with advantage. The subcutaneous injection of ether may also be employed.

A few words may be added in reference to what has been called catheter fever. To associate a febrile complication with the name of the instrument is, I think, a mistake; to have connected it with conditions under which the instrument has to be resorted to would, it seems to me, have been better, as the cause would then have been indicated rather than the incident. The only catheter fever that I know of arises out of sepsis, a condition which is oftener seen, though less strikingly, in cases where no instrumental treatment has been resorted to.

If you want to avoid the occurrence of sepsis, or absorption of putrid material, in connection with cases where catheterism has to be either temporarily or permanently employed, take care that you use clean instruments with no contaminating influences in their interior; that they are used antiseptically; that they are well anointed with a suitable lubricant; and, lastly, when the urine has been removed, that the bladder is not left in a condition to foster the development of putridity and to favour its absorption. What must be the physical condition of the bladder of an old man, which for months or years has been accustomed to hold pints, when by the catheter its contents are suddenly withdrawn? If, under these circumstances, a bladder is rapidly emptied, a suitable fluid must be thrown in as a substitute until the flaccid walls of the viscus have adapted themselves to a gradually diminishing space. Again, putrid mixtures of urine, mucus, and perhaps blood, must

not be allowed to undergo the chance of decomposition. The bladder, in many cases, is to be just as carefully antiseptised when it is empty, as its analogue, a chronic abscess. If attention to these points, and others arising out of them, were more generally insisted upon, we should hear but little of catheter fever.

## SEVENTH LECTURE.

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RETENTION OF URINE — CATHETERISM — IMPASSABLE STRICTURE — ASPIRATION OF THE BLADDER — TAPPING — COCK'S OPERATION — FORCIBLE CATHETERISM.

OF all the operations in surgery, there is none, perhaps, that affords such immediate relief, or calls forth greater gratitude from the patient, than the successful use of the catheter for retention of urine.

This is the most distressing accident that can happen to a patient who is the unfortunate subject of stricture. The circumstances which bring it about hardly require further notice here. Frequently it is spasm upon organic stricture, or a plug of mucous that occludes the urethra, and converts difficult micturition into complete retention. An excess of some sort is generally the exciting cause. In elderly persons especially, an attack of retention is often brought about by what is commonly called "catching cold," when the action of the skin is arrested, and a greater amount of work is thrown on the kidneys, to which is superadded some degree of local congestion. I need hardly remind you that a person may be passing urine while he is, to all intents and purposes, suffering from retention, that is to say, his bladder is distended with urine. I have known this condition escape recognition, and the dribbling of urine ascribed to incontinence or paralysis of the bladder. The diagnosis of retention is usually so simple that it is sufficient merely to mention this to guard you against falling

into such an error. Circumscribed distension above the pubes, and pressure on the rectum, serve to indicate to the touch that of which his sensations make the patient only too conscious. In judging of the degree of distension, we must to some extent be guided by the sensations of the patient. If one man is so insensitive as to require relief by the catheter only, when the fundus of his bladder reaches his umbilicus, we must not infer that another less needs it because this line has not yet been, in his case, attained. Our powers of endurance in this respect are very different. The patient with the small contracted bladder, from long-standing stricture, suffers all the horrors of retention long before the limit I have indicated has been reached.

The consideration of treatment may be simplified very much by dividing the subject into two heads: first, where a catheter can be passed; and, second, where it cannot, or its use is impracticable. Where retention is urgent, it is undoubtedly the duty of the surgeon at once to attempt catheterism. If he succeed, relief is immediate; and attention will subsequently be turned to the removal of the cause. Where retention is not urgent, a hot bath and a full dose of laudanum frequently produce the desired effect. A very opposite plan—viz., the introduction of a piece of ice into the rectum—is considered by some an almost infallible remedy. I believe this was first suggested by Cazenave. As a rule, however, an ordinary catheter, flexible or metal, will first be tried without any delay. Where there is much difficulty in getting through the stricture, a steel probe-pointed catheter will be found exceedingly useful. Its chief advantages are that, being made of metal, it is thoroughly rigid, and therefore under the absolute control of the operator; and, further, it possesses all the excellence of the smallest catheter with, from its probe-pointed extremity, all the facility of introduction presented by the probe-pointed bougie. The most recently-made instrument gradually increases in size from the bulbous extremity towards

the handle, as shown in figure 16. Before concluding that it is impossible to pass a catheter, I would advise you to try one of the whalebone filiform bougies and a tunneled catheter as described in a previous lecture. I have often succeeded at the first trial, after attempts with ordinary catheters have failed and I have been requested to tap the bladder.

Turning to those cases where catheterism is impracticable—instances of which in the present day are fortunately exceedingly rare—we find ourselves provided with various expedients. Some have only to be mentioned to be condemned, whilst others have stood the test of experience. Aspiration has been very advantageously employed in this class of cases. I have selected the following as exemplifying this mode of treatment:—

CASE I.—In the summer of 1876, W. F., aged 44, was admitted into the Royal Infirmary, under my care, suffering from a stricture, the result of an injury to the perinæum. On several occasions he had been unable to pass water, and much difficulty was always found in relieving him by catheterism. During the last few months his stricture had become much tighter, so much so that the urine only escaped in drops.

I saw him at the time of his admission; his bladder was largely distended, and he was in urgent want of relief. On looking at his perinæum, I found an old scar, and around it considerable induration. I endeavoured to pass a small catheter, but without avail. As the abdomen was exceedingly tense and the patient in great distress, without further delay I punctured with the aspirator immediately above the pubes, and removed, I should think, three pints of urine. In the course of two hours I had the patient placed in a warm bath, and afterwards gave him a full dose of laudanum. The urine began again to issue in drops, and no further retention was experienced. I kept the patient in bed for four days,



Fig. 16

during which period no attempt was made to pass a catheter, nor was the procedure necessary. It was interesting to notice how, under the influence of rest, alkalis, and purgatives, the patient's powers of micturition improved. I subsequently gradually dilated the urethra until I could pass Holt's instrument, by means of which I ruptured the stricture. In the course of three weeks the patient left the Infirmary, being able to pass for himself a No. 12 bougie.

CASE II.—W. W., a sailor, was admitted on April 24th, 1874, into the Royal Infirmary, under my care, for retention of urine. The patient had suffered from stricture for three years, and for some time prior to his admission the stream of urine had been diminishing in size. Twelve months ago, when at sea, he had suffered from retention, and was with difficulty relieved by catheterism. Two days before his admission he had been drinking freely, and on his arrival at the Infirmary he had not passed urine for some twenty-four hours.

On admission the bladder was largely distended. Catheterism was ineffectually tried. When I saw him shortly after admission, I found him in great distress. I attempted to introduce a catheter; but, from the state of the parts, I felt convinced that the instrument could not be made to enter the bladder without exposing the patient to injury by a persevering and perhaps protracted attempt to relieve him in this way. I then introduced into the bladder above the pubes one of the smallest needles of the aspirator, and removed a large basinful of highly-coloured urine. The patient was at once relieved. I gave him a dose of laudanum, and during the night he commenced to pass urine naturally in a small stream. A brisk cathartic was prescribed on the following day.

On the fifth day after his admission, without much difficulty, I passed a No. 3 bougie through a tolerably long and tight stricture. From this date gradual dilatation was employed, and on the 12th of May, when he was made an out-patient, dilatation had proceeded as high as No. 8. I should add, that he suffered no inconvenience from the supra-pubic puncture made by the needle, nor could any mark be discovered forty-eight hours afterwards.

It may be asked, was it impossible to introduce a catheter? I would not like to admit this in any case; for, assuming an average amount of dexterity, such an operation, in the greater number of strictures, is a matter of perseverance only. But

what may be possible may not at the same time be expedient. In the second case a reasonable trial had been first made by the house-surgeon, but without avail; a warm bath and an opiate, pending my arrival, were also ineffectually tried. I was not surprised, on introducing a catheter as far as the obstruction, at this want of success, the stricture being dense and unusually hard and resisting. As the patient required immediate relief, the aspirator was resorted to in preference to the older plan of puncturing the bladder by a trocar and cannula above the pubes or through the rectum.

It may be objected that the aspirator would only afford temporary relief, inasmuch as the urethra was obstructed. To this I reply, that in the great majority of cases it is the spasm which, superadded to the stricture, determines the retention, and if temporary relief is afforded, the power of micturition becomes re-established. Here the patient, in the course of a drunken debauch, had distended his bladder to a degree over which he could not exercise a proper expulsive effort. The bladder being artificially emptied, the patient's distress was at once relieved, and on the collection of water again in the bladder he took care that it should not remain there to exceed the limit beyond which he was incapable of exercising successfully expulsive power. Time was thus allowed for getting the patient into a condition suitable for further treatment, and on the fifth day, as was predicted, the first step in the treatment by gradual dilatation was commenced, and uninterruptedly continued to a satisfactory issue. I would remark, in passing, that the treatment by gradual dilatation was carried on more rapidly in this case than I could have wished, in consequence of the patient being very desirous to resume his work. Experience shows that dilatation, to be successful, should be very gradually employed.

As a means for relieving retention of urine arising from organic stricture, pneumatic aspiration cannot fail to be exceedingly valuable; for, apart from the considerations I have urged,

it is obvious that a stricture is never improved by anything like a prolonged effort at catheterism. Any laceration of the urethra (and where there is hæmorrhage this must to some extent occur) necessitates a corresponding cicatrization, and this, by its subsequent contraction, adds to the obstruction. In tight strictures, with retention and a distended bladder, the difficulty in introducing a catheter is undoubtedly greater than where the bladder is capable of acting, and with this difficulty the risk of doing harm with the catheter is proportionately increased. The aspirator will in such cases be found a suitable means for tiding over that period of time when the difficulty is greatest, thus enabling the practitioner to commence his treatment under more favourable circumstances.

A considerable number of recorded cases show the safety with which the aspirator may be used. With a fully distended bladder it is almost impossible to injure the peritoneum; and if the finger is for a moment pressed firmly above the pubes before the instrument is introduced, until a pit or depression is formed, the passage of the needle is absolutely painless. My observation would quite confirm the remark of a patient recorded by Dr. J. Bell,\* whose case has been published, "that it was the easiest way of having the water drawn off he had ever experienced." That aspiration may be repeated an almost indefinite number of times is evident from a case recorded by Mr. W. Brown, where, for retention from an enlarged prostate, it is stated, "we used the aspirator daily, and on some occasions the pain was such as to require the operation to be performed twice in the day. Altogether we performed the operation fifteen times, with immediate relief on every occasion, and without the smallest inconvenience or injury from the punctures or perforations of the needles." † More recently in writing upon this subject, Dr. J. T. Hague remarks: "This patient, therefore—an old man of ninety—

\* *Edinburgh Medical Journal*, April, 1874.

† *British Medical Journal*, May 23, 1874.

passed no water *per urethram* for five weeks, during which period he was aspirated thirty-four times, and has neither cystitis nor peritonitis; the only discoverable ill-effect being an inflammatory thickening about the seat of the numerous punctures."\* Eventually, however, Dr. Hague succeeded in passing a soft catheter. Possibly during this long interval of inactivity the prostate had undergone, as I have noticed, some shrinking in size.

In tapping the bladder with the aspirator there are two points which should be remembered: (1), only to use a fine needle, and (2), in introducing the needle above the pubes, to keep as close as possible to the bone, and so avoid puncturing the peritoneum. The point at which the peritoneal reflection takes place I have found to be slightly variable, but a clear space of at least half an inch always exists where the needle may be introduced with safety. This space is increased when the bladder is largely distended, as in cases of extreme retention. It has been pointed out by Dr. W. Macfie Campbell, that aspiration may be followed by urinary extravasation along and around the puncture of the aspirator trocar; and he records a case where such a sequence took place.† Tapping by the rectum, which he seems to prefer, is by no means free from such an accident, and I cannot help thinking, from some experience of both methods, that if a comparison were made, say between a hundred cases of each proceeding, the balance of advantage and of risk would largely favour aspiration. I am glad of the opportunity of recording this objection, as well as the caution accompanying it, that, to prevent such an accident occurring, should the bladder again require emptying in this way, aspiration must be resorted to before anything like extreme tension of the walls of the viscus has been reached.

Mr. E. H. Howlett has advocated a post-prostatic method of tapping the bladder which I will describe in his own words ‡:—

\* *The Lancet*, August 29, 1885. † *British Medical Journal*, Feb. 21, 1880.

‡ *British Medical Journal*, February 13, 1886.

The postprostatic operation is free from any and all the objections which can be raised against the other operations; it is well placed for drainage, it does not interfere with the genital tract, nor is it in the way in defæcation. The part of the bladder attacked is the same as in the rectal operation, the site long since selected by surgeons as most favourable for tapping. On the other hand, the risk of urinary extravasation behind the deep pelvic fascia, of injury to the vesiculæ seminales, and to the peritoneum or knuckle of intestine in the recto-vesical pouch, may be urged as disadvantages of the operation. They are, I believe, largely imaginary, as with proper care the dangerous rocks can be avoided; the most real danger is that of urinary extravasation; but, as will be pointed out in the cases to be mentioned, the muscular and mucous coats of the bladder contract immediately after the withdrawal of the instrument, and prevent any urine from escaping, whilst, even should some do so, it will choose the path of least resistance and appear at the perineal puncture. To perform the operation, the patient is placed in the lithotomy position, and, if the bladder be contracted, it can be filled from the urethra in most cases. The forefinger of the left hand is then passed into the rectum, and made to explore the prostate and inferior surface of the bladder. Some sort of idea can then be formed of the distance the trocar will have to travel to reach the bladder, and the direction. The forefinger being retained in the rectum, a trocar and cannula, of the size of a No. 12 catheter, is thrust through the skin about three-quarters of an inch in front of the anus, and slowly pushed on till resistance is felt to have disappeared; the trocar is then withdrawn and the bladder emptied. The subsequent steps of the operation require no description. In my cases, the metal cannula was maintained, but it would be better to pass through it into the bladder a No. 8 red elastic tube, and withdraw the cannula. It is a great advantage to be able to introduce so large a tube, as the chances of its becoming blocked are reduced to a minimum. Finally, to make the patient comfortable, a tube is attached to the catheter, and the urine drained into a bottle. To retain the catheter, Mr. Appleton, of Beverley, devised a very simple apparatus. It consists of a triangular piece of thick leather, with a hole in the centre, through which the catheter passes. One small hole behind, and others at either of the front corners, permit the tapes passing, which are attached to a belt round the loins.

The description is illustrated with two cases. As I have not had an opportunity of practising this operation, I can only say that it appears a feasible proceeding.

Tapping the bladder with a trocar and cannula above the pubes, or through the rectum, are expedients which, like

aspiration, are only to be resorted to where there is a prospect of re-establishing within a short period the natural passage of the urethra. Puncture of the distended bladder immediately above the pubic bone with a penknife, or similar instrument, has been practised by sailors and others who have found themselves urgently suffering from retention and stricture, when they were beyond the reach of professional assistance. In some instances I have met with, a permanent fistulous opening has been the result, whilst in others, after a little time the opening has closed, when the natural function of the urethra could be restored.

The chief objection to the older methods of tapping by the rectum or above the pubes is that they require the retention of the cannula within the bladder for some days; this is not only a source of discomfort and irritation to the patient, but the former is not free from the chance of infiltration of urine occurring and of permanent fistulous communication between the bladder and the rectum. Hence, as a temporary expedient for affording relief to the distended bladder, I think aspiration is to be preferred.

Where the chance of restoring the urethra is only remote, as in some old-standing cases of stricture, Cock's operation "of tapping the urethra at the apex of the prostate, unassisted by a guide-staff," may be resorted to with advantage. I frequently see a patient upon whom I performed this operation many years ago. For five years previously he had endured all the vicissitudes that could happen to the subject of, at times, an impassable stricture. Since the operation he has enjoyed perfect health and comfort at the expense of micturating through the perinæum. Cock's operation is so well known that I need not further refer to it.\*

It is the practice of some surgeons, whilst relieving by incision the pressing symptom—viz., the retention—at the same time to effect a division of the stricture. Such a pro-

\* *Guy's Hospital Reports*, 1866.

ceeding, always difficult of accomplishment, is not, as a rule, to be recommended, it being better to reserve the treatment of the stricture until the retention has been relieved, unless, as sometimes happens, after the urethra behind the stricture has been opened with the knife, a guide can be passed into the bladder.

“Forcing the stricture” is a proceeding so likely to be attended with disastrous consequences as not to be entitled to recommendation. If you cannot pass a catheter by the exercise of a legitimate amount of firmness and tact, you are pretty sure to do harm by such hap-hazard manipulations.

In conclusion, let me urge the importance, in all cases of retention, of making a careful and well-directed effort to give relief to the patient in the most effectual and speedy manner—namely, by the introduction of the catheter. In but a few will you fail; it is only after such a trial as this has been made that you are justified in entertaining the other proposals to which I have alluded.

A few words, however, will not be lost in urging the importance of after-treatment in all cases of sudden urinary retention requiring relief by the catheter, or its alternatives, as I have just referred to. Many persons owe years of misery to the fact that after the sudden retention, the bladder and associated parts never regained their original power and function. A common consequence of sudden retention and distension of the bladder is complete temporary paralysis, which may extend over some days or even weeks. Under such circumstances it is obvious that careful and regular catheterism must be employed until such times as the powers of the patient in this respect are restored. Local treatment will be assisted by the use of such medicines as strychnia, nux vomica and cantharides, all of which I have at times found exceedingly useful in helping to restore the power of the bladder. Then there are cases where the paralysis from retention is only partial, the patient not being able to completely empty the viscus. These are the instances which are sometimes over-

looked: the unemptied bladder, with probably an excess of mucous, becomes slightly inflamed and irritable, and the urine is offensive. The bladder is much in the same condition as the man who recovers from a stroke of paralysis, with a weak leg, and can only hobble about with a stick, and, possibly, with his sense of feeling in the limb diminished. This is the class of cases where the viscus after its distention requires help with the catheter, and with tonics for some time to come, and if it does not get this assistance at the right time, not only is it troublesome, but it never completely recovers. Let me take an example:—

CASE.—A healthy male, aged 31, consulted me in consequence of his inability to hold his urine either by day or night. Ten years ago he had suffered from sudden retention, which lasted for forty-eight hours; for three weeks subsequently he was entirely dependent on the use of the catheter; since then he had been constantly dribbling urine both by day and night.

I examined him, and found that he could pass about one ounce of clear normal urine. I then passed a soft catheter, and drew off nearly eight ounces more urine. There was a slight stricture, admitting a No. 8 English catheter. I instructed him to empty his bladder night and morning, or oftener if necessary, since which he has commenced to improve. I also prescribed the tincture of lytta.

Then, again, there are cases of retention so extreme and prolonged as positively to induce more or less sloughing of the lining membrane of the bladder from pressure and stretching. I have one such case under observation now, where, from what has been passed by the urethra, we have reason to believe that the patient has lost the whole of the mucous membrane of his bladder. He is gradually obtaining the power of micturition, and promises to recover. I refer to these points for the purpose of showing that we have not always completed our work when we have administered to the urgent necessities of a patient suffering from retention of urine. Retention from enlargement of the prostate will require special consideration on a future occasion.

## EIGHTH LECTURE.

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### CASES NOT SUITED FOR DILATATION — QUESTION OF OPERATION — INTERNAL URETHROTOMY AND ITS MANAGEMENT.

IN a previous lecture I have expressed my opinion that, where it is practicable, gradual dilatation by bougies, and the subsequent occasional use by the patient or the practitioner of the same instrument, is the best treatment for by far the larger proportion of urethral strictures. This is an opinion which is confirmed by the examination of a very large number of stricture cases, extending over many years, including cases operated on in different ways and by different surgeons both at home and abroad. For a long time past I have made it a business to carefully inquire into the history and treatment of every stricture case that has come under my notice both in hospital and private practice. I need hardly say that the information that has thus been acquired has proved exceedingly useful to me in determining the actual value of almost all the proceedings which have from time to time been brought before the profession for the treatment of urethral stricture and its complications. Though, as I have already said, the treatment of stricture by the extremely simple process of dilatation is probably the one that is most generally useful, it cannot be regarded as of universal application. You will meet with strictures that will not dilate; strictures which, when dilated, recur in spite of a continuation of the process; strictures which will not admit of dilatation by reason of the symptoms which arise in the course of the process. These are examples which I have met with in the practice of those where it would be impossible to take exception to the manner in which the process was carried

out, and, further, they correspond with my own observations in practice. To meet cases such as these, various methods of treatment have been suggested with the view of improving the immediate results, and of rendering the future more hopeful and enduring. Of these, internal urethotomy has held, and at present holds, a prominent position. It is to the consideration of this operation that I shall now proceed.

To divide a band of cicatricial tissue which narrows the urethra down to perhaps the size of a pin head, so that in a moment it will permit the introduction into the bladder of a full sized bougie, and at the same time to be conscious that this can be accomplished with the same precision as if done on the external surface of the body, seems at first sight to offer the most rational method of treating this affection. And so undoubtedly it would prove to be were it not open to two objections, which to my mind seriously weigh against this proceeding. These are:—first, that the operation is almost invariably followed by the development of rigors and fevers, which in some instances have proved fatal when least expected; and, secondly, because the operation has not been followed by permanent benefit. Some of the worst cases of stricture that I have had to treat have been those where internal urethrotomy had been previously performed. The former objection has been more thoroughly dwelt upon in a previous lecture in connection with my remarks on toxic urine.

With objections such as these before me, I am naturally disposed to say that I should limit the performance of internal urethrotomy to a few cases of penile stricture, where dilatation is impracticable. There is less risk in this locality, and better results than from dilatation can here be obtained. At a future stage I shall state at length and illustrate the circumstances under which I think internal urethrotomy as I have adapted it may be resorted to in cases of stricture involving other portions of the canal. Though holding these views in regard to internal urethrotomy, I am aware that other surgeons of large experience

differ from me, and, therefore, I have less hesitation in describing a method of treatment which I can only recommend with some reserve.

In contractions of the meatus of the urethra, division may conveniently be accomplished with a blunt-ended tenotomy knife. I usually make an incision in the median line, directly downwards. In strictures further down the canal, but still within the penis, division may be performed with the *bistourie cachée*, or with an instrument which I have found very useful for this purpose, viz. : a probe-ended knife; this may be readily manipulated within the stricture, and its division completed. (Fig. 17.)

In the deeper portion of the urethra division is not so readily accomplished. For its performance we are provided with two sets of instruments—viz., those cutting from before backwards, of which Maisonneuve's and Teevan's urethrotomes are examples; and those cutting in an opposite direction, amongst which I may mention Watson's and Civiale's. Of these instruments I certainly find that Watson's is the best.\* In principle it resembles the staff used by Syme, to which is added a knife concealed in the narrow portion of the guide, immediately in front of the shoulder, which indicates the position of the stricture to be divided. (Fig. 18.) The protrusion of the knife is regulated by a screw at the handle, and by means of a dial attached to the screw

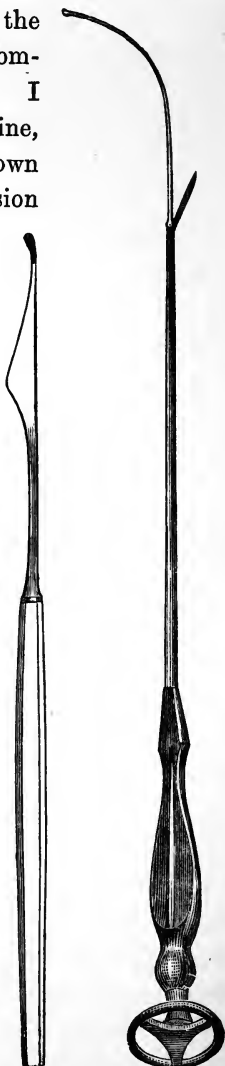


Fig. 17.

Fig. 18.

\* *The Lancet*, Oct. 23rd, 1875.

the degree to which the knife is projected is at once indicated.

Here is a good example of this plan of treatment:—

J. H., a seaman, aged 40, was admitted into No. 1 ward in September, 1877, for stricture, from which he had suffered for some years, and which had been treated on several occasions by gradual and continuous dilatation. The stricture was situated at the bulb, and would only admit a No. 1 bougie. Dilatation was an exceedingly painful process, the passage of the bougie being invariably followed by a severe rigor; further than this, the stricture was very contractile, and slow progress only was made. I considered this a suitable case for internal section. A fortnight after his admission, I was able to introduce Watson's urethrotome, with which I divided the stricture; afterwards I readily passed a No. 12 catheter and emptied the bladder. On the following day, instead of difficulty in micturition, he passed to the opposite condition, and complained of inability to hold his water. This I have noticed on several occasions; it is due to the suddenness of the relief afforded by the removal of the stricture, before the bladder can adapt itself to the altered conditions. In the course of a few days this new source of difficulty disappeared, as I had assured the patient would be the case, and the full size of the urethra was maintained by the introduction of a suitable bougie. This operation the patient was soon able to accomplish for himself, and when he left the hospital, which he did in a fortnight, all difficulty in passing water was removed.

I have been using, as some have seen, a urethrotome which is somewhat different from the instruments at present in use or figured in the text-books. The staff consists of two parts—viz., the anterior portion, sufficiently small to pass into the narrowest strictures, and behind this an expanded portion, corresponding in size to a No. 10 bougie, and terminating anteriorly in an abrupt shoulder. Within the broad portion of the staff is contained a lancet-shaped knife, which is made to project by a spring at the handle, and run along a slit in the narrow part of the instrument. The extent to which the blade can be projected is regulated by a screw. It can be easily taken to

pieces, for the purpose of cleaning or re-sharpening the knife, by unscrewing the stylet at the handle, when the blade becomes disengaged and can be taken from the slit. In the accompanying drawings the instrument is represented

closed (Fig. 19), and with the knife projected (Fig. 20) as for the division of a stricture. When the instrument is passed down the urethra, the position of the stricture is indicated by the broad shoulder, against which it is made firmly to press, as in Syme's staff for perinaal section. The position of the stricture being thus ascertained and commanded by the broad shoulder, the knife is then made to project, and to divide the stricture. If the instrument is held firmly, the division of the stricture is usually indicated by the feeling of tension giving way, something like when a tendon is divided for the cure of a deformity. The knife is then withdrawn, when, if the stricture has been completely divided, the broad shoulder passes on readily towards the bladder. Should any further obstruction be indicated, its division may in the same way be accomplished. I usually pass a full-sized catheter into the bladder, to make sure that all obstruction is completely removed and to draw off any water that may be there.

It will be seen that by this instrument the urethra is divided at the

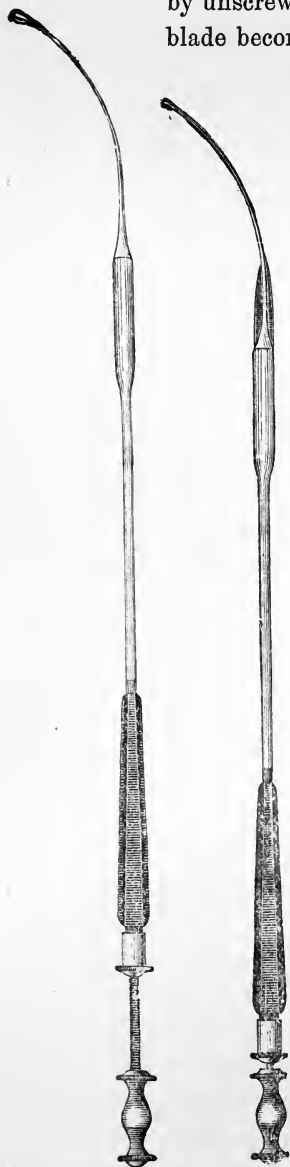


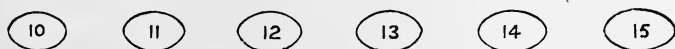


Fig. 19. . Fig. 20. instrument the urethra is divided at the

strictured spot in two places instead of one. I believe this will be found to be an advantage, inasmuch as contraction is less likely to follow where we have two longitudinal intervals in which healthy repair is allowed to take place. To maintain the interval made by the urethrotome until such time as cicatrization has been accomplished, I employ in the subsequent treatment of these cases oval-shaped bougies.

The incisions that are made by the urethrotome are as represented in this sketch.  My object is to open up these incisions and maintain them patent, so that, when cicatrization is completed, the section of the urethra, if put on the stretch, would be thus.\* To effect this, after division by the urethrotome, I  employ oval-shaped bougies, sections of which are here represented, by means of which dilatation of the urethra in a lateral direction is specially maintained :—



In the largest sizes the circumference of the bougies gradually diminishes towards the handle, so that the meatus of the urethra is not kept continuously on the stretch whilst they are being introduced.

Whatever instrument we may select for the performance of internal urethrotomy, there are certain conditions or rules to be remembered which are essential to its safety and success. First: we must take care that complete division of the contracted part or parts of the urethra can be effected. To ensure this, after the stricture has been divided I now pass a Gross' dilator (Fig. 21), and, having partially opened the blades, withdraw it; this is a sure test of a free urethra. In this way the nick made in a slight stricture, which has escaped free division with the knife, is completely opened out. Section thus determines the point at which divulsion commences. I have seen

\* Putting in what Dr. Gouley describes as two "cicatricial splices."

internal urethrotomy resorted to in a case where the mass composing the stricture was so extensive as to be amenable solely to perinæal section. Under such circumstances failure could alone be anticipated. Second: the operation should not be performed where there is any active suppuration going on in the urethra. Apart from the risk of incurring septicæmia, it is desirable that the incision made should heal as kindly as possible, and without the intercurrent of that which interferes with healing, viz., active inflammatory action. Mr. Lund lays considerable stress on this point in his interesting essay on internal urethrotomy.\* Third: on the completion of the operation I leave a silk catheter in the bladder for forty-eight hours, connecting it with a piece of india-rubber tubing, by means of which the urine is constantly, and, to the patient, imperceptibly running off into a receptacle placed by the side of the bed. This plan keeps the urethra outside the catheter much drier than the old way of letting the patient remove a plug from the orifice of the instrument whenever he feels a desire to micturate.

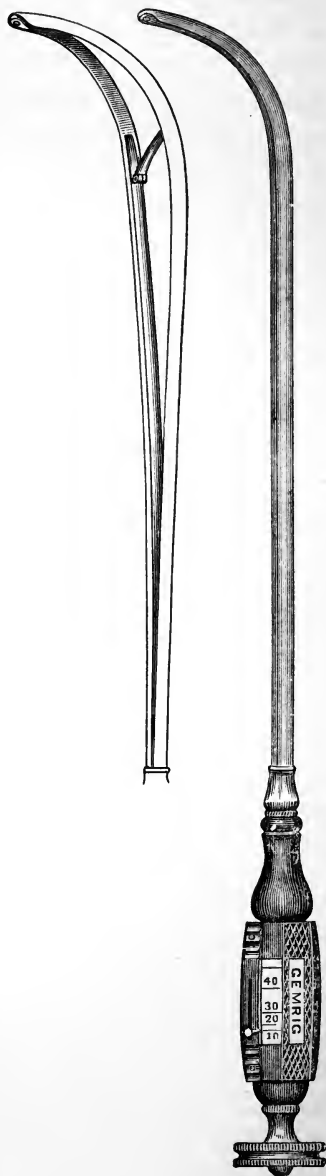


Fig. 21.

\* *On Internal Urethrotomy.* Churchill, 1877.

Having regard to the objections I have already urged against the extended performance of internal urethrotomy, I should like to lay stress upon certain details I now employ whenever I decide to perform this operation. It will be at once seen that these details have reference to the prevention of anything deleterious being absorbed by the wound, and to promote the kindly healing of the incision. For the last few years, whenever I have performed internal urethrotomy, either singly or in combination with external urethrotomy, prominence has been given to these points:—In the first place, before the urethrotome is passed, the urethra is well carbolized by being injected with carbolic oil in the proportion of 1 to 20. The stricture is then divided, and a catheter passed, by means of which the bladder is completely emptied of any urine it may contain. Before the catheter is removed, the bladder is well washed out with a solution of corrosive sublimate (1 in 10,000). The silk catheter is then substituted, and the bladder washed out by injecting the mercurial solution up the instrument two or three times a day. When at the end of forty-eight hours the silk catheter is finally withdrawn, it is re-introduced morning and night for the purpose of permitting the urethra and bladder being washed out by the antiseptic fluid.

By these precautions, not only may rigors and fever be entirely avoided, but, by keeping the parts operated on thoroughly irrigated, the wound heals with a much softer and less contractile cicatrix than where it is left to granulate in constant contact with the urine that the urethra is unable to expel. After an operation on the urethra, I invariably give the patient, immediately he is placed in bed, five grains of quinine and a glass of hot brandy-and-water, containing a few drops of laudanum, at the same time taking care that he is well surrounded by hot rubber bottles. The longer the rigor can be postponed the slighter is the fever that follows, and the less it is to be feared.

The risk of hæmorrhage has been advanced against internal urethrotomy. I may add, that where the operation is done with

an instrument such as the one I am using and have described, no apprehension of this need be entertained, inasmuch as, instead of dividing the urethra pretty deeply in one place, the the same effect is produced by a more limited incision at two points of the circumference. Dr. F. N. Otis,\* of New York, in cases of free bleeding after internal urethrotomy, passes an ordinary elastic tube with an open end beyond the point where the stricture has been divided, and retains it by means of a bandage; if this fail, the urethra is irrigated with water of a temperature of 120° Fahr. He thinks these measures will arrest any hæmorrhage proceeding from this cause.

I do not commence the introduction of bougies until four or five days after the performance of the operation, and this is usually continued up to numbers 14 and 15, so as to make sure that the incisions are fully opened up. It is hardly necessary to add, that the patient must be enjoined to continue the use of the bougie occasionally.

Amongst the contingencies observed as remote consequences of urethrotomy, I must note two instances of imperfect erection of the penis. In both cases the nature of the stricture had been such as to require very free division by the surgeons in previous charge of the cases. Hæmorrhage had evidently been severe, indicating that complete section of the obstructing masses had been made. A few weeks after each operation the patients observed that when the penis became erect there was a joint of flaccidity about the root corresponding with the seats of stricture, which gave a flail-like appearance to the organ. Thus its use for the purpose of procreation was seriously interfered with. Whether this was due to the division of a nerve, or to the blocking up of the vessels supplying the spongy tissue in the vicinity of the stricture, I cannot state. In both instances I fear it proved a source of permanent, if not irremediable, inconvenience. Considering the extensive character of the strictures, I do not see that less could have been done, whatever the consequences of the operation might prove to be.

\* *Philadelphia Medical Times*, Jan. 12, 1884.

## NINTH LECTURE.

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### TREATMENT OF STRICTURE BY DIVULSION, OR HOLT'S OPERATION—STRICTURE STRETCHING.

As divulsion will, I think, as a rule, be found more acceptable to the general body of practitioners than internal urethrotomy in cases of stricture which cannot be kept in order by dilatation, I shall occupy your attention by a reference to it, and to a process which is an outcome of it, and which we are accustomed to speak of as stricture stretching.

So far as permanent results are concerned, I do not think that the advocates of internal urethrotomy can claim any very decided advantage over it, whilst, on the grounds of safety, I am convinced that Holt's method has the priority. So far as liability to absorption of anything that might induce systemic poisoning is concerned, a tear is perhaps safer than a cut. Many strictures are entirely submucous, and I can quite understand what Mr. Christopher Heath\* has shown to be the case, that the obstruction can be removed whilst the mucous membrane of the passage is left intact. In describing cases such as these, Benjamin Bell refers to them as if a string had been tied around the urethra.

The details of Holt's procedure are so well known that I need not trouble you with them. The chief objections urged against it are, that the urethra is torn, frequently at its weakest spot in the strictured circumference, and that thereby the amount of cicatricial material is considerably increased. Hence, if the

\* *British Medical Journal*, July 17, 1869.

symptoms of stricture return, or rather, are allowed to return, they are of greater severity and more difficult again to treat. There may be some amount of truth in these allegations, but I think the objections to the operation have been greatly exaggerated. I have practised it on something like one hundred cases. I never met with any difficulty in performing the operation; I have never had a fatal result; it has never been followed by serious hæmorrhage or by distressing symptoms, such as extravasation of urine; and though I cannot speak as to the ultimate results in anything like the majority of my cases, I know of many patients upon whom I operated from ten to fifteen years ago who are living in complete comfort, and to all intents and purposes are rid of those urgent symptoms which necessitated this mode of treatment. Like many other surgical operations, it is frequently brought into discredit by disregard of those very conditions upon which its success depends.

In only one instance have I had occasion to supplement this operation with another. It was in the case of a man with a tight traumatic stricture of the bulb. Here divulsion was followed by signs of abscess, accompanied by rigors and fever, forty-eight hours after the operation. As I did not know what this might lead to, and not wishing to incur a risk that I could not see, I had the patient placed in the lithotomy position, and opened the divulsed portion of the urethra by a central perineal incision. I then passed a drainage tube into the bladder; this gave immediate relief, all symptoms abated, and the patient made a good recovery. I saw him two years afterwards, when he told me he kept himself well by passing a good sized bougie every week. He was an intelligent man, and recognised the importance of using his bougie with regularity. I have occasionally had to repeat the operation of divulsion; one patient returns about every two years, as he prefers to submit to the operation occasionally rather than to undergo the trouble of passing a bougie for himself. These are, however, exceptional

cases, which ought to be mentioned in connection with this method of operating.

Some years ago I published a few remarks\* on a modification of Holt's practice, which, as they represent my views of to-day, I may be permitted to reproduce. They relate to what I then described as "Stricture Stretching." In adopting this phrase I do not wish to be understood as advocating the use of either a new instrument or a new treatment. I merely desire to state how I have applied well recognised principles with equally well known means.

Stricture stretching, as I endeavour to carry it out, is very closely in imitation of the process to which gloves are submitted by the salesman after purchase has been made. Into each stall of the glove the glove-stretcher is introduced, in order that the fingers may the more readily pass in. If the manipulation be dexterously done, neither are the seams split nor is the kid torn; if clumsily, a rent and a false passage for the finger is the result. So much for the simile; now for the reality. The instrument I employ is Holt's dilator, and the stretching is effected quite slowly by the introduction of successive sizes of dilating rods, until the dimensions required are obtained. All this is to be done at one time, with or without an anæsthetic, according to circumstances. I almost invariably have the patient placed under ether, as it is important that the process should be slow enough to permit of the tissues stretching without tearing. I do not think we fully recognise the extent to which the urethra is capable of being distended. Dr. Otis, of New York, has demonstrated the truth of Sir Everard Home's observation that "the urethra is everywhere much larger than had been supposed, exceeding the size of the largest bougie in use in a very great degree." And what is true of the healthy urethra will be found to apply, though in a less degree, to the strictured one. I first applied this method of treatment to tight strictures, with retention, where only the

\* *British Medical Journal*, Dec. 10, 1881.

smaller sized instruments could be passed, as I felt it was neither fair to the patient nor the practitioner, to whom I was desirous of rendering assistance, to leave them with a small instrument in the bladder, which at any moment might be blocked up or accidentally withdrawn. If a No. 1 or 2 metal catheter will pass, a No. 3 or 4 can be induced to follow, and upon this my modification of Holt's dilator, and then all further anxiety is at an end. When summoned to cases of retention, I find it makes no matter to the patient if you at once carry dilatation up to its highest point, and this I now invariably do when circumstances seem to me to demand it.

My adaptations in Holt's dilator (Fig. 22) specially fitting it

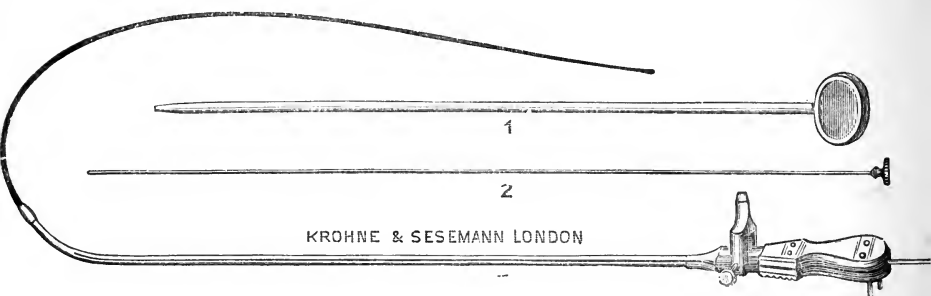


Fig. 22.

for this purpose may be briefly stated. In the first place there is attached to it a pilot bougie, which may not be necessary for all cases where stretching is to be employed; yet as this treatment is intended for some of the worst forms of the affection, it is as well to be prepared for every contingency. If the pilot bougie be not required, a round top-screw takes its place. Then I have increased the number of dilating rods to eight, so that the process of stretching may be gradual, and in order that there may be no jerking as the several rods are introduced, a spiral spring controls the separation of the two portions of the instrument instead of a screw.

The size of the dilator before a rod is introduced is No. 3, English gauge; the largest dilating rod brings it up to rather

over No. 12, so that between these two extremes we have seven gradations in size. If the stricture is so tight as not to be capable of receiving the dilator, dilatation by means of metallic bougies must be employed until the required size is reached.

A word or two more in reference to the use of the instrument. Full dilation, with or without the pilot bougie, as I have described, is first slowly obtained. The process occupies from ten to thirty minutes, according to the resistance, care being taken not to tear and so cause much bleeding. I then withdraw the dilator, pass a catheter to remove all urine, and throw into the bladder about a couple of ounces of corrosive sublimate solution (1 to 10,000). No instrument is retained, but the bladder and urethra are washed out every day with the sublimate solution. I usually give a dose of Fleming's tincture of aconite immediately after the stretching has been practised, and require the patient to keep his bed for twenty-four hours. A full-sized bougie is then passed every second or third day, and the patient is instructed how to do this operation for himself. He is then enjoined to continue this practice, and fitted with a suitable instrument. If, in all cases of retention occurring with tight stricture, this or a similar instrument were used, both patient and practitioner would be none the less happy for the knowledge that, whatever spasm might temporarily do, there was, at all events, a way to the bladder which was capable of admitting a No. 12 catheter.

The following case from notes supplied to me by my then house surgeon, Dr. Hugh Rayner, now of H.M. Army, will serve to illustrate this method of treatment\* :—

CASE.—A. M., a mechanic, aged 47, was admitted on Dec. 20, 1881. He had suffered from stricture for eighteen years, could only micturate in drops, and had two urinary fistulæ through which urine passed. His urine was ammoniacal; he had cystitis, and his general condition was most deplorable and unpromising. Only fine metal bougies could be passed, and no progress was made. After a week's

\* *British Medical Journal*, June 24, 1882.

trial, the patient was placed under ether, and the stretcher introduced after a preliminary passage of fine bougies. The process of stretching occupied twenty minutes, and was almost bloodless. As the case was complicated with fistulæ, a No. 10 soft catheter was left to act as a drainage tube, continuous drainage being practised after the manner suggested by Professor John Chiene.\*

The patient received the greatest possible relief. Continuous drainage was employed for nearly three weeks, when the catheter was withdrawn. The fistulæ were found soundly healed. The patient shortly afterwards left the Infirmary, micturating normally, without the least leakage at the fistulous points, and able to pass a full sized bougie for himself, the use of which he promised to continue. He has not since been heard of.

\* *Edinburgh Medical Journal*, Dec., 1880.

## TENTH LECTURE.

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### EXTERNAL PERINÆAL URETHROTOMY IN PASSABLE STRICTURES— PERINÆAL PARACENTESIS VESICÆ.

WE have hitherto dealt with cases of stricture involving the canal and its immediate surroundings; cases where, by reason of the limited extent and depth of the obstruction, we are able to afford relief by some form of dilatation, or where the contraction could be brought within the range of an incision from within the canal, or by divulsion or stretching.

We have now to consider instances where the obstruction is more extensive, or where it involves the structures constituting the perinæum, or is complicated with fistula of an unusually indurated nature, or is impassable. Further, you will occasionally meet with strictures of a much more limited nature, but presenting most remarkable degrees of obstinate contraction and irritability, and quite beyond the reach of those methods of treatment which up to this time have occupied our consideration. It is to these, which I have thus endeavoured to classify, we shall now devote our attention. It must clearly be understood that strictures of the kind I have just referred to, as a rule, go on from bad to worse; for a time they may remain as a local inconvenience, but sooner or later they induce disease in the organs above them, and then the efforts of surgery to relieve will, under such circumstances, be both limited and hazardous. We have had numerous illustrations of the kind of strictures I allude to, and for the treatment of these some form of external urethrotomy or perinæal section has been resorted to.

For the division of stricture from without, the *boutonnaire* of French authors, we are largely indebted to that practical surgeon, the late Professor Syme. I do not mean to say that he originated this operation, but he taught us how it might be more efficiently performed, and to what class of cases it is applicable. The application of perinæal section to the class of cases I have mentioned, viz., (1) the worst kinds of complicated passable strictures; and (2) impassable strictures; necessitates the performance of the operation under two very different circumstances. First, with a guide, where section of the stricture should be certain and complete; and, second, without a guide. The term "external perinæal urethrotomy" best represents what we desire to do. When a staff can be passed into the bladder, the operation is comparatively simple. For its performance no better rules can be followed than those laid down by Syme. By carefully incising the perinæum from the raphé in the median line, the staff is reached, and by keeping the point of the knife in the groove, the stricture can be completely divided without injury to the surrounding parts. The knife must be kept undeviatingly in the central line of the perinæum: unless this rule is strictly adhered to, free hæmorrhage may be expected: in this does the operation consist.

There are one or two details I will refer to: in the first place, before the operation is commenced, all hairs should be removed as far as possible from the parts. If this is not done, they prove a source of annoyance as well as accumulators of dirt and discharge. In the second place, when the incision into the groove in the staff is made, you must satisfy yourself that you have completely divided, not half the stricture, but the whole of it; if any stricture material is left behind unfreed, the operation will prove of but little permanent service. So long as the knife is made to do its work along the median line of the body, troublesome hæmorrhage need not be feared. At the conclusion of the cutting part of the operation, when any small vessels have been tied

within reach, a drainage tube should be introduced into the bladder. This can be conveniently conducted into the bladder on one of Wheelhouse's small gorgets (fig. 24), which, when the staff has been laid bare, can be run along the groove into the viscus. After the trial of many varieties of drainage tubes, including those made of glass and silver, I prefer the gum-elastic which have been made for me.\* They are of different sizes, so as to fit all wounds; they are provided with eyes for securing them by a perinæal bandage, and with a nozzle, by means of which rubber tubing can be applied to them, so as to drain the bladder into a receptacle beside the patient's bedside. In this way he is kept clean and comfortable, and free from all smell. If there is any hæmorrhage or oozing after the operation, these tubes, by their size, exercise pressure on the wound throughout its entire depth, and will be most serviceable in stopping bleeding. I generally retain these tubes from a week to a fortnight, of course, changing them occasionally; the bladder should each day, or twice a day, be washed out through them. The drainage of these cases is of the first importance; if it is thorough and complete, you need not fear rigors or fever; if it is imperfect it is in this respect no better than an internal urethrotomy.

After this operation, when the drainage tube has been removed, urine usually flows incontinently by the wound for a few days, then it gradually takes up the natural channel, and the healing process is completed. In an experience of perinæal section which includes not less than one hundred cases, the instances where the perinæal wound has failed to heal have been exceedingly few, the failures being chiefly traceable in my earlier cases to my having failed to divide the whole length of the stricture, and in those unfavourable cases of urinary tuberculosis where I have been compelled, by the state of the urine and the intense irritability of the bladder, to endeavour to give relief in this way. In two cases

\* By Mr. Wood, 81, Church Street, Liverpool.

where I operated for tumor of the bladder my success was only partial, and the perinæal openings failed to close, but I cannot say that this proved an inconvenience to the patients; on the contrary, they were able to pass, without pain, through the perinæum that which could not have been voided by the natural channel. Nor in the experience just referred to have I encountered serious hæmorrhage which I could not control with the ligature, by the use of some kind of tampon, or, more recently, by my large-sized drainage tube. Since I have adopted the last mentioned expedient I have only had one case of secondary hæmorrhage, and that is one deserving of mention:—

CASE.—E. A., aged 48, was admitted under my care in April, 1885. When twelve years old, he had retention of urine and extravasation. Since that time he has never been free from stricture and numerous fistulæ in various directions, including the scrotum, perinæum and pubes. A large quantity of urine was passed through the fistulæ, some by the urethra. The stricture was narrow and long; the man was cadaveric-looking, and in a very miserable condition.

On May 2nd I succeeded in stretching his stricture, under ether, until I could pass a full-sized grooved staff. I then did perinæal section, so as to have but one opening instead of a dozen tortuous fistulæ communicating with the urethra, and put one of my drainage tubes into the bladder. There was no difficulty or hæmorrhage in doing the operation. A week afterwards, on May 10th, he had a sudden attack of hæmorrhage which continued in spite of tampons, tubes, and hæmostatics; the hæmorrhage occurred at intervals on seven or eight occasions, and though the case at first promised well, I was beginning to despair. What troubled me most was the unaccountable nature of the hæmorrhage. I was just about to have the patient put upon the operating table for the purpose of opening up the wound, and perinæum if necessary, in search of the bleeding spot, when my house-surgeon, Dr. Bristow, discovered that the bleeding came along one of the old disused fistulæ which communicated with the wound I had made at the time of operation, and was from the pubic artery, as it lay under cover of the pubic arch. No doubt the fistula, no longer sluiced with urine from the urethra, had ulcerated and opened into the artery in this position.

Dr. Bristow's discovery of the source of the hæmorrhage, in the

first place, led to a more precise plugging of the wound, so as to exercise pressure on the bleeding vessel, and, further, suggested to me what I should do in case the bleeding returned, as the patient was not in a condition to bear the repetition of such attacks. I had arranged to open up the sinus which passed beneath the pubic arch directly to the artery, to expose the bone surface of the arch, and then to remove a portion of it with a trephine; this would have enabled me to reach the artery and to place a ligature upon it. We had previously found out that we could temporarily command the bleeding by introducing the index finger underneath the arch, where the pulsation of the artery could be distinctly felt. I decided upon this course in preference to attempting to ligature the artery as it crossed the spine of the ischium. The last plugging being a precise one was, however, sufficient for the purpose. We had no return of hæmorrhage, and the patient made a good recovery. When he was last seen, some months after the operation, he had returned to his occupation as a clerk with his wound and fistulæ healed, and passing urine naturally. I thought this, the only serious case of hæmorrhage I have had after perinæal section or external urethrotomy, worthy of notice in connection with the subject which is now occupying our attention.

As my experience of external perinæal urethrotomy, including all kinds of cases, has been considerable—I have already referred to it as exceeding one hundred cases—I may be expected to say something as to the results which have been observed. For the purpose of comparison I can arrange the cases operated on into three classes, each of which will require a few words of comment.

(1) Cases of bad stricture with sound organs from the kidneys downwards.

(2) Cases of bad stricture with unsound organs.

(3) Cases of perinæal section undertaken for the relief of conditions due to tumors of the bladder and prostate, and in cases of urinary tuberculosis.

In no instance where the operation has been undertaken could I ascribe a fatal result to what was done, nor did the deaths occur within such a period of time as to lead me to believe that the proceeding had in any way contributed towards

this result. In the first class of cases, the progress of events after the operation universally tended to show its great value as a remedy for the kind of cases it was intended. It has frequently proved, as far as I have been able to judge during my observation of it, now extending over twenty years, a complete cure for the complaint. When I say complete cure, I mean that the patients to whom I refer had no re-contraction of the stricture following the operation, and that they entirely dispensed with the use of the bougie, either for the remaining years of their lives, or up to the time I was cognisant of their existence. If this does not mean a cure for stricture I do not know what is. Opportunities for testing this point during the life of an individual, and after his death, are, unfortunately, exceedingly rare. I can only adduce one instance, but this is quite sufficient corroboration for what I have felt it my duty to say in connection with the results of this operation. The following is a brief outline of this case:—

CASE.—The patient was a man aged 46, who died of chronic Bright's disease of the kidney, in Dr. Davidson's ward in the Royal Infirmary, in February, 1885. When ten years old he injured his perinæum, and subsequently suffered from stricture and urinary fistulæ of the worst type. In 1867, Mr. Bickersteth performed Syme's perinæal section for him. In 1869, he was known to be quite well, and, during his recent visit to the Royal Infirmary, Mr. Bickersteth took care to determine that the stricture had not returned, though no precautions appear to have been taken by the patient during this long interval of time. After his death from renal causes the urethra was removed and carefully examined. No sign of stricture could be found; in fact, the calibre of the urethra, along the line where the section had evidently been made, was positively larger in proportion to the rest of the canal; it seemed to have yielded somewhat under the pressure of the urine.

What is proved to have happened here, I feel confident, is applicable to other former patients who from time to time come under my observation.

Passing to the second class of cases where the operation

has been performed on persons known to have unsound urinary organs from the kidneys downwards, the question of degree at once enters into the consideration. As a rule, the operation was undertaken as a necessity, with the view of giving the vital organs above a chance of recuperation by the removal of that which was the cause of their becoming complicated. I must say that I have seen the greatest possible relief following the removal of the strain which a bad stricture causes, and by the perfect rest attained so far as the function of micturition is concerned. To see a person sleep calmly the whole night, instead of getting up to micturate and to strain a dozen times, is in itself evidence of the good that must and does follow the employment of this operation. On watching cases of this kind carefully, it will be frequently found that stinking pent-up ammoniacal urine is exchanged, as it flows out of the drainage tube, for an excretion presenting an acid re-action but slightly differing from normal urine.

In the third class of cases, where the operation is undertaken for what I would speak of as the convenience of the patient, temporary relief will, to some extent, make amends for the cure which cannot be promised under these circumstances. In urinary tuberculosis the operation is not to be recommended, in my judgment, unless the urine becomes of such a character as to render it impossible that it can escape in the natural way. For the mere reflex irritability of urinary tuberculosis it is not to be advised, as I have had opportunity of observing. In tumors and malignant disease of the bladder, where it is found impossible to remove the growth, it will often give relief in affording a vent for that which cannot escape by the urethra, and which, if not got rid of, remains to decompose and to become putrid within the bladder. In the cases where I have thus had to operate when hæmorrhage from the bladder was a prominent symptom, I invariably found this diminish or entirely cease when opportunity was given to the viscus of emptying itself spontaneously by this new route, and of exer-

cising a more or less contractile power upon that which provided a cause for the bleeding. Though the third class of cases cannot be included in the treatment of stricture to which this lecture is devoted, in relation to external perinæal urethrotomy, it is convenient to make these remarks as bearing upon the whole subject. It would, in fact, be almost impossible to disconnect them.

It will also be proper to notice here what may be called perinæal paracentesis vesicæ, rather than a perineal section, though the principle is somewhat similar.

Chronic suppurations of the male urethra probably include some of the most troublesome cases amongst the minor affections of the urinary passages. Some years ago I described a form of syringe (Fig. 2) which had been found serviceable in irrigating the urethra and curing a considerable proportion of cases which were included under the somewhat comprehensive name of gleet. An extended experience of this treatment shows that a certain number of instances will be found where it has proved as useless as others to which the urethra had been submitted.

A careful analysis of cases of chronic continued or intermitting suppuration shows the existence of at least two conditions under which such a discharge is maintained: (1) chronic urethritis, where the line and relations of the urethra are in no essential degree altered; and (2) cases where the urethral walls have been rendered more or less pouched, or where localised suppurations out of the line of the urethra exist—as, for instance, in connection with the larger lacunæ, Cowper's glands or their ducts, or even with the prostate. In the former, and by far the commoner class of cases, the affection seldom fails to disappear under the employment of those measures which secure a thorough medicated irrigation of the whole length of the urethra. It is, however, the second class of cases, where the maintenance of the suppurative process is rather peri-urethral than urethral, that I wish here to dwell upon. Time will be saved by my briefly quoting a case in point.

CASE.—A gentleman, aged thirty-four, consulted me early in 1884 for an intermitting urethral discharge of a purulent character, at times excessive and resulting from a gonorrhœa contracted four years previously. This discharge, which was distinctly purulent, had resisted all kinds of internal and external treatment. He had used astringents of all sorts ; an injection consisting of a grain to the ounce of each of the four sulphates—viz., iron, copper, zinc, and alum—seemed to control it best, but without curing it ; a deep urethral injection of a strong solution of nitrate of silver was used under the direction of another surgeon, but without benefit ; whilst, as a last resource, internal urethrotomy had been performed for the purpose of removing a slight contraction, but without any better results.

I have specially referred to these three methods of treatment, which were successively tried in this case, as representing the most potent as well as probably the most effectual means of treating certain obstinate forms of ordinary gleet. With this history before me, I came to the conclusion that the case could not be regarded other than as one of an exceptional character. All that I could detect abnormal was a slight contraction behind the bulb where the internal urethrotomy had been performed some weeks previously. To repeat this operation, even upon the lines which have been so carefully laid down by Otis, seemed to offer no guarantee that a better result would be obtained. It appeared to me that the urethra in some part was of the nature of a suppurating sinus, through which urine flowed out and injections flowed in, and which could neither be efficiently drained nor irrigated. In the case of the patient I have referred to, his life had been rendered most miserable for four years by the constancy of this discharge ; he had run some considerable risk to get rid of it ; he had the tolerably sure prospect of a stricture forming, and after what had been done but little hope of getting rid of his ailment. Under these circumstances I did not hesitate to apply to his urethra those well-recognised principles of surgery which are generally applicable to suppurating sinuses—to place the canal at rest for some

time, and to prevent urine coming in contact with it. I opened the membranous urethra on a grooved staff at the apex of the prostate, and put in one of my smaller bladder-tubes with rubber tubing attached, through which the urine was drained into a vessel by the patient's bedside. This process was continued for twenty-five days, during which time the whole of the urine was passed continuously through the drainage apparatus. The urethra was frequently washed out with tepid water from the meatus, the fluid escaping by the perineal wound. In this way not only was the urethra placed at rest, but kept free from all influences which might interfere with the processes of repair going on within it. It sometimes happens in these cases, after the patient has become used to the perineal tube in the bladder, that an involuntary expulsion of a few drops of urine will take place by the side of the tube into the anterior portion of the canal, and escape by the meatus, of which the patient is conscious. When this happens I tell the nurse or the patient to immediately syringe out the urethra from the meatus through the wound, so as to prevent the lodgement of a single drop of urine in the canal. In ten days after the tube was removed the perineal wound soundly healed, and the patient was up. Though nearly twelve months have now elapsed, he has never seen a drop of discharge from the urethra, nor are there any signs of a stricture remaining. I saw him on his way out to South America in perfect health.

I have since operated on two other patients, in one of which I also performed an internal urethrotomy, with equally satisfactory results. In another instance a precisely similar proceeding was adopted for a chronic hæmaturia, which, I believe, had its origin about the prostate. No tumour or other cause for the hæmorrhage could be discovered, but the bleeding ceased after a month's perineal drainage, and has never recurred, the patient being now in excellent health. I presume there was some bleeding spot, which healed under the influence of rest and the temporary withdrawal of all action on the part of the muscles engaged in micturition.

A careful examination of some specimens of long-standing stricture shows that they must have been formed out of the remains of pouch-like and localised suppurations connected with the urethra filled up with granulation tissue. The formation of stricture masses such as these would possibly have been prevented by the adoption of more thorough means of drainage, for whenever cicatricial tissue is found thus disposed it seems to point to the difficulties under which the process of healing was effected. A well-performed lithotomy leaves behind but little trace of the processes of repair, though these possibly extended over some weeks.

There are one or two points connected with the operation to which I will refer. In the first place, I would describe it as a puncture of the membranous urethra from the perinæum; for it may be reduced to one of the simplest proceedings in surgery, as it has already proved to be one of the most serviceable. Speaking for myself, my object is to make the puncture on the staff in the median line sufficient to permit my index finger to feel the groove, and at the same time to fit the incision. In this way hæmorrhage is effectually controlled from the first. I generally succeed in touching the staff with the first use of my knife. If anything more is wanted to make the groove felt, I use a pointed knife with the edge off. In this way I neither cut my finger nor cause hæmorrhage whilst I am preparing the way for the introduction of Wheelhouse's gorget, which is then made to slide along the grooved staff into the bladder. In cases of this kind it is quite unnecessary to push the finger into the bladder—in fact, this should be avoided. I once saw an acute prostatitis follow the process of dilatation with the finger, which is quite unnecessary. The bladder drainage-tube can be readily pushed along the gorget into its position, and in this way the operation may be accomplished almost without bleeding. In the after-management of these cases the diet should be of such a nature as not to require the action of the bowels for at least a week; then the tube should be removed, and a soap-and-water injection carefully given.

## ELEVENTH LECTURE.

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### TREATMENT OF STRICTURE BY EXTERNAL AND INTERNAL URETHROTOMY COMBINED.

It will be at once obvious that external perinæal urethrotomy, as usually practised, is not applicable to certain forms of the disorder, inasmuch as it is impossible to bring the stricture within reach of a reasonable incision from the perinæum. There are strictures in the penile portion of the urethra just about the junction with the scrotum—strictures of great length, and multiple strictures which it would be impossible, without largely extending the range of the incision, to include within the limits of a perinæal section. In a previous lecture I have urged two objections against internal urethrotomy which, to my mind, limit very materially its application; these are, first, that it is liable to be followed by a form of fever which is septic, and sometimes fatal. In connection with this point I have already explained my views relative to toxic urine. In the second place, internal urethrotomy does not furnish any better permanent results than other methods of treatment. It must be noted in connection with the latter objection, how unfavourable the conditions which generally attend the operation of internal urethrotomy are for producing the best kind of repair. The section which is requisite for the division of the contraction necessarily paralyses the urethra to the extent, or rather more, of the wound that has been inflicted. Hence the process of repair has to be carried on with the wound soaked in the urine that is left behind to stagnate and to undergo change after each act of micturition. This is very

different from the incontinent flow of urine over the glazed and granulating open wound of a lithotomy or of a perinaeal section. In one case it is merely contact of urine with open surfaces ; in the other, retention within a confined space.

On carefully considering the whole subject, it seemed that, if it were possible to assimilate the performance of internal urethrotomy with some other operations on the urinary apparatus, where there was an absence of any special form of fever or septic intoxication following them, and where the wounds inflicted did not heal with a scar-tissue, which subsequently manifested an inordinate disposition to contract, we might mitigate, if not entirely remove, the more prominent objections connected with internal urethrotomy to which I have alluded. If, for instance, we take the operations of lithotomy and of perineal section, where the urethra is more or less involved in the wound, and where, at the same time, provision is made for the escape of urine from the bladder by the newly formed passage, we shall find both proceedings free from the subsequent occurrence of rigors, and from the development of the special form of wound-fever which, in varying degrees, almost constantly follows internal urethrotomy. If the temperature-charts be taken, say of fifty cases each, of lithotomy, of perineal section, and of internal urethrotomy, we shall see whether such a statement is not warrantable, whatever the deduction therefrom may be. I cannot remember an unexplainable rigor following immediately upon a lithotomy ; but, in my experience, after internal urethrotomy, it has been almost constant. In what lies the difference ? Are the anatomical and physiological arrangements in the female sex sufficient to account for its entire immunity from anything resembling urinary fever or intoxication as observed in the male, in all cases involving operative interference with the female urethra ?

Why do not persons suffering from tight oesophageal strictures suffer from rigors and fever after the passing of bougies,

even when it is evident that the operation has occasioned some breach of surface ?

The only case I have seen where rigors and fever, such as are here referred to, happened after an operation for stone, was once when, by reason of a stricture, I failed to extract a stone which lay imbedded in the walls of the urethra, immediately behind the contraction. I preferred, after a trial, to dilate the stricture, and to leave nature to complete the process of expulsion, which she speedily did at the next act of micturition. The canal was somewhat lacerated by the forceps, and consequently the condition was not unlike that of an internal section for stricture. Notwithstanding a sharp attack of urinary fever, extending over two days, in connection with this almost trivial incident, the patient made a good recovery.

Again, though the urethra is cut with the knife, and is often torn or scraped during the extraction of rough stones with the forceps, I have never known, in a personal experience of over a hundred cases of lithotomy, in persons of all ages, a stricture of the urethra to follow; but I have known, within this category, two instances where persons were permanently cured of bad strictures by an extension of the wound necessary for the removal of the stone.

A rupture of the urethra following a blow or contusion of the parts, is generally regarded as exposing the patient to an almost certain risk of a stricture of the worst kind. This liability is, I believe, from some experience of these injuries, largely influenced by the conditions under which the patient is placed immediately after the accident: in other words, the liability to urinary fever, and to subsequent stricture, is mainly determined by the line of treatment that is pursued. Let me take two examples: 1, where the urethra was completely torn across, and there could be no doubt as to the treatment; and, 2, where the rupture was partial, and less heroic measures were, with the best intentions, employed.

CASE.—Three years ago, a middle-aged man fell on his perinæum,

across a joist, and completely ruptured his urethra, about the membranous portion. My house-surgeon at the Infirmary could not pass a catheter. I saw the patient within an hour of his accident, had him placed under ether, managed to slip a staff into his bladder, and made him a median perineal urethrotomy; through this the urine drained for several days. The patient made just as good and rapid a recovery as any case of median lithotomy I have seen, and is now as sound as if he had been operated on for stone, instead of having had his urethra torn across. He has not a sign of stricture, nor is he now likely to have.

CASE.—Five years ago an omnibus conductor was kicked behind the scrotum, and bled from the penis. He was found to have a partial rupture in his membranous urethra. A soft catheter was, however, introduced into the bladder, and was retained for ten days, when the patient began to pass his urine naturally. During this period, the temperature-chart showed many variations which gave cause for uneasiness. He apparently made a good recovery. Twelve months afterwards, he again came under treatment, for a stricture of the worst type.

Instances such as the former, which are not exceptional, point to the conclusions that a stricture is by no means a necessary consequence of a ruptured urethra, and that the development of the contraction has a relation to the treatment that immediately follows the infliction of the lesion. My own observations on this point appear to correspond with those of Dr. Max Oberst, of Halle, who states,\* that if this injury be treated by a free outlet for the urine, and effusion from the internal wound, it need seldom excite serious apprehension; but if, on the other hand, it be not judiciously dealt with, it will in many instances not only threaten the life of the patient, but permanently impair the urethra.

A careful consideration of the various points to which I have already given prominence led me to conclude that it might be possible advantageously to combine the two operations of external and internal urethrotomy.† In doing so, my object

\* Volkmann's *Sammlung Klin. Vorträge*, No. 210.

† I find this method of operating has also been practised by Professor Annandale. *Edinburgh Medical Journal*, June, 1875.

was to secure that the healing process following the division of the stricture should proceed without being subjected to those influences, immediate and remote, which I have ascribed to the presence of stagnant urine in the wound. I desired to put in, as Gouley \* expresses it, "a cicatricial splice," which should be formed under circumstances most favourable to kindly repair. How this was to be done, will best be understood by a perusal of the cases I will now relate. The first case, which served to lead up to the more complete development of the process is as follows :—

CASE I.—J. McL., aged thirty-six, came under my notice at the Royal Infirmary in May, 1884, with a tight bulbous stricture. Fourteen years previously, internal urethrotomy had been performed. With care, he kept well until within the last twelve months, when, by neglecting the use of the bougie, the stricture returned; it was a dense one, and would not yield to dilatation. On June 6th, I performed Holt's operation, with a smaller divulsor than usually employed. After this was done, a full-sized bougie passed readily into the bladder. There was much febrile excitement afterwards, and on the 10th, a considerable perineal tumefaction could be felt. The patient's condition was such as to cause me some anxiety. With the view of averting abscess, and possibly extravasation of urine, on the 11th I passed a grooved staff, opened the perinæum, and introduced a drainage-tube into the bladder. The point where the urethra was opened was just behind the stricture that had been divulsed. The patient made a good recovery; and when he was last seen, eleven months after the operation, a No. 10 bougie passed easily, and he was urinating normally.

This case is merely introduced as being a suggestive one in connection with others that followed. It pointed to the local and general advantages that immediately followed the complete withdrawal of the urine from contact with the divulsed portion of the urethra.

CASE II.—J. C., aged forty-five, was admitted on July 2nd, 1884, with a tight stricture of the bulbous urethra, perineal fistulæ, and a

\* *Diseases of the Urinary Organs*, p. 76, New York, 1873.

chronic orchitis. On July 9th, I succeeded in passing through the stricture a No. 2 English bougie. In the evening he had a severe rigor, and was feverish afterwards. On July 11th, I divided a long stricture with Maisonneuve's urethrotome. I then placed the patient in the lithotomy position, passed a grooved staff, opened the membranous urethra, and inserted a drainage-tube into the bladder. No rigor or fever followed, and the urine drained clear of the stricture. Twice a day the urethra was washed out from the external meatus with an antiseptic fluid; for nineteen days the urine drained by the perineal tube. After the drainage-tube was withdrawn, the wound closed, and the patient left the infirmary on August 15th, passing a full stream, and with a urethra admitting a large-sized instrument.

CASE III.—P. McQ., aged forty-five, was admitted on June 10th, 1884. He had a urethra which was impervious just behind the scrotum, and numerous fistulæ, through which pus and urine trickled. The first thing to be done was to make him an urethra, or rather, a direct way into his bladder. In the course of seventeen days, I succeeded in doing this by taking a line which I thought as nearly as possible corresponded with the original urethra. Along this I passed a urethrotome, and made him a passage which would admit a good sized staff. Then I did him a perineal urethrotomy for drainage; the new urethra was washed out with an antiseptic fluid frequently from the front, with the result that, by August 16th, all the fistulæ had closed but one, and the patient returned home urinating normally, and passing a full-sized instrument.

CASE IV.—E. C., aged twenty-five, was admitted in January, 1885. He had a tight stricture in front of the scrotum, and a urinary fistula, with indurated edges, through which urine passed. By the urethra, the patient voided his urine in drops. On January 15th, I divided the stricture with a Watson's urethrotome. I then pared the edges of the fistula, and closed it with silver wire. A perineal urethrotomy was next performed, and a drainage-tube passed into the bladder. It is not necessary to follow the case throughout. On February 21st, he was discharged well; that is to say, his fistula and perineal opening were both closed. He urinated naturally, and a full-sized bougie could be passed. He has reported himself once since as quite well.

CASE V.—W. C., aged thirty-nine, was admitted on January 2nd, 1885, with the history of a stricture extending over twelve years. He had undergone, some years ago, Holt's operation, at a Birmingham

hospital. He had a tight long stricture about the bulb, and a less important one behind it. In addition he had an orchitis, which was suppurating, and required opening. The principal stricture was long and cicatricial, such as is generally seen when from any cause the operation of rupture or divulsion of a stricture has failed. I could only pass an extremely fine instrument to commence with, and it was not till February 6th that I had made sufficient progress to get in a urethrotome. Having succeeded in doing this, I divided both strictures internally. In doing so, the longer stricture was so hard that the instrument failed at first to accomplish what I desired, I therefore had to reintroduce it, and to use it more freely. To satisfy myself that every source of constriction, along the whole length of this very distorted urethra had been removed, I introduced Gross's dilator, and, having somewhat separated the blades, after the instrument had fairly entered the bladder, I withdrew it. I thus satisfied myself that every cause for stricture had been removed. In doubtful cases, after internal urethrotomy, I have thus used Gross's dilator with advantage; to operate and to leave a single band of contracted tissue undivided, however slight, is to provide a cause for the development of another stricture. After I had satisfied myself that the stricture had been removed, I introduced a grooved staff, and opened the membranous urethra for the passage of a drainage-tube into the bladder.

The progress of this case was somewhat delayed; in the first place, the internal urethral incisions had been so free, that some blood-clots were retained in the anterior section of the canal and suppurated; it was further necessary to make a median antescrotal incision, to give exit to this discharge. I have since provided against the latter contingency in cases where I have had to make the internal urethrotomy freer than usual, by introducing a piece of drainage tube through the external meatus, and bringing it out from the perineal wound by the side of the bladder-drainage tube; this permits any blood to drain off, and affords a ready means for washing out this portion of the canal with an antiseptic fluid. In this way the urethrotomy wound can be made to heal, not only without contact with urine from the commencement, but free from the constant presence, in a confined space, of the products of

the healing process. In other cases, where the internal cut has been small, I have found it sufficient to have the anterior portion of the urethra washed out frequently with an antiseptic fluid; this can be readily done by a syringe introduced at the external meatus, the fluid escaping by the perineal wound. I have thought it necessary to refer at some length to these details, inasmuch as they will be found to provide for the complete arrest of hæmorrhage from the internal section, should such occur, and, further, for the application of the antiseptic system in the subsequent management of the wound, if this precaution be deemed desirable.

To continue with my case:—

In addition to the drawback which led to this digression, the patient had a pretty sharp attack of bronchitis, to which he appeared subject. The perineal drainage-tube was finally withdrawn on March 19th, by which time the cicatricial splice was soundly completed, and a full-sized instrument could be passed into the bladder.

On April 23rd, the patient was discharged well. On May 11th, 1885, he presented himself for examination. Both wounds were healed; he was passing urine, as he stated, in a full stream for the first time in his life, and a large bougie passed without any stricture being felt. What pleased me most was to find the steady improvement that had taken place in the tissues of the urethra; instead of being harsh and unyielding, they had become almost as soft and pliant as in the original state. This was obvious both from within and without.

I am indebted to my house-surgeons, Mr. Pearson and Mr. Dawson for the careful manner in which the numerous details connected with the management of these, and other like cases, were carried out.

Sufficient illustrations have now been given of a method of operating which has, so far, justified my expectations. I shall proceed to notice some points which the cases suggest. Though it would be premature to speak of the combination of these two well-recognised methods of operating, as affording a means of radically curing urethral stricture, there is much encouragement

for such a hope in what has already been observed. I have now operated in this way on twenty occasions, without meeting with any discouragement; and though this number is not large, yet it includes the worst and most unpromising types of the disorder.

In the first place, it has been uniformly noticed that after the double operation we have never had a rigor, nor the development of that special form of urinary fever which frequently follows internal urethrotomy, and is occasionally fatal without forecast or explanation. If there has been any febrile excitement at any time after these operations, it has not been of an exceptional kind, but similar to what may follow the infliction of any wound, or it has been explainable by some such ordinary occurrence as the retention of matter in a disused fistula, or sinus. In the next place, we have been able to put into the urethra, at the point required and to the extent necessary, a cicatricial splice or interval of new tissue, formed and completed without contact with urine or other possible source of irritation. If the urine be capable, as it has been suggested, of forming, under certain conditions, poisonous alkaloids, their absorption by these wounds has been rendered well nigh impossible. The urethra has been placed absolutely at rest, and thus the process of repair has been facilitated.

We have already had evidence as to the different character of the scar-tissue which is produced by this process, compared with that which follows internal urethrotomy, where no special provision is taken to prevent the contact of stagnant urine and discharge with the healing wound. It is not difficult to imagine that the cicatrix in the two instances must differ.

One word before I finish, in reference to the kind of external urethrotomy that is performed. To speak of it as a perineal section is to convey a wrong impression. It should be described as a perineal puncture with a knife, completed with a probe, along which a drainage-tube is conducted into the bladder, the process usually occupying a couple of minutes or thereabouts.

The few details of the operation have already been described more at length in the previous lecture (page 135). It will be seen to differ but slightly from what is commonly known as Cock's operation. Here the proceeding is merely for the purpose of drainage, and for placing the urethra at rest. It is, of course, preceded by the performance of an internal urethrotomy, which at once admits the passage of a full-sized sound.

It may be urged, What is to be done with those cases where it is found impossible to pass even the smallest instrument to commence with into the bladder? All I can say is, that in practice I do not meet with these cases; where urine will escape, an instrument will enter. The great improvement that has recently taken place in urethral instruments for such purposes has almost entirely removed the impassable stricture. Where there are fistulæ, and the urethra is at some spot imperious both to urine and to instrumentation, we have a very different condition of matters. One of the cases illustrates what may be done in the manufacture of a new urethra, capable of permanently discharging its normal function.

The drainage-tubes I employ are described in the previous lecture. In some cases, where the floor of the bladder is very irregular, or is sacculated, a double drainage-tube is preferable. The length of the drainage-tube in its relation to the interior of the bladder is of importance. It should be just within the bladder and no more. I have tubes of different lengths, and verify their suitability to each case by rectal examination. After they have been inserted in this way, a correct fit and thorough drainage is obtained.

In reference to this method of operating, Dr. F. N. Otis, of New York, writes me:—"I have advocated the combined method of operating for many years of all strictures which present in the anterior urethra complicated with close stricture at, or deeper than five and half inches, and my experience gives me a growing confidence in its value." In a discussion which

followed a paper \* read upon this method of operating, I was glad to find that already other surgeons of experience could testify to the advantages that I have urged in connection with this proceeding.

\* *British Medical Journal*, Nov. 27, 1886.

## TWELFTH LECTURE.

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### IMPASSABLE STRICTURES—WHEELHOUSE'S OPERATION—THE RESTORATION OF THE OBLITERATED URETHRA—SUBCUTANEOUS URETHROTOMY—MASTIN'S OPERATION.

THOUGH the term impassable stricture is, in a sense, a relative one, it represents a variety of the disorder which is sure to present itself more or less frequently to everyone who is liable to be engaged in the surgical treatment of urinary disorders.

When perineal section has to be undertaken for impassable stricture, it is an operation of very considerable difficulty, often taxing to the uttermost the patience and perseverance of the surgeon. Under these circumstances, the most must be made of the two landmarks which such cases present; these are (*a*) the anterior extremity of the stricture, which is indicated by the point to which a staff can be passed, and (*b*) a dilated condition of the urethra, which is found behind strictures of long standing, and which, when the bladder is distended, is evident to the touch externally, or to the finger in the rectum.

In cases complicated with perinæal fistula through which urine has for a long time been passing, even the latter landmark—a dilated condition of the urethra behind the stricture—can hardly be said to exist, as the urine escaping through the fistulous passages fails to exercise that dilating power upon this part of the urethra which is usually observed in strictures that are not so complicated.

With these for landmarks, such as they are, to effect a junction between them, and so to reach the contracted urethra by division of the stricture, two plans of proceeding are practicable. One is by incising the perinæum along the median line down to the point at which the staff is arrested, and from

thence backwards towards the dilated portion of the urethra. The other consists in reversing this order of proceeding by plunging the knife towards the dilated portion of the urethra behind the stricture, and then carrying the incision forwards toward the permeable part of the urethra. I have practised both plans with success, but I am disposed to think that the former method is the one more generally to be recommended.

When the operation by either method is successfully practised, the operator should be able to pass a catheter into the bladder, along the whole length of the urethra, so that he can satisfy himself that the stricture has been completely divided. I usually leave a drainage tube in the bladder, introduced through the perinæal wound, as I have already described in connection with the previous operation. Subsequently the treatment consists in the introduction of bougies along the urethra at intervals of four or five days, according to circumstances.

As I have said, the operation of external urethrotomy without a guide is one of very considerable difficulty, and no one can undertake it without a misgiving that, though the proximal portion of the urethra may be opened up, the stricture may escape that complete division which is essential to the ultimate success of the operation. To meet these difficulties an operation has been practised by Mr. Wheelhouse, which is now known as the "Leeds operation." Considerable credit is due to Mr. Wheelhouse for the thoroughly practical manner in which the operation has been planned, and, inasmuch as you will find only a meagre description of it in the text-books, I shall quote *in extenso* Mr. Wheelhouse's paper in the *British Medical Journal*, of June 24<sup>th</sup>, 1876 :—

Notwithstanding the length of time that has elapsed since, in 1869-70, I brought before the profession, in the columns of the *British Medical Journal*, my method of finding my way, in cases of impermeable stricture from the perinæum, *through* the stricture and into the bladder, the subject seems to have received so little notice that I deem it advisable once more, after several years of successful employment of the operation,

to revert to the subject; and I am induced to do this the more willingly, because I find that even in the most recent and most voluminous works on surgery, the subject is dismissed with very few words, and the old hazardous measure of reaching the bladder without any guide—it *may be through*, or it *may be altogether wide of*, the stricture—is still recommended and described as the one in ordinary use. Over this method, the procedure which I adopt has at least the advantage of greatly increased precision; it renders an operation, confessedly hitherto one of the most difficult in surgery, a comparatively easy one, and one which, in my hands and in those of my colleagues, has given results infinitely more favourable, both in immediate and ultimate effect upon our cases, than any we had ever seen before its introduction. The instruments required are as follows: lithotomy bandages; a special staff, fully grooved through the greater part, but not through the whole, of its extent, the last half-inch of the groove being “stopped,” and terminating in a round button-like end (Fig. 23); an ordinary scalpel; two pairs of straight-bladed forceps,



Fig. 23.

nibbed at the points; ordinary artery forceps and ligatures; sponge; a well-grooved and finely probe-pointed director; Teale's probe-gorget (Fig. 24); a straight probe-pointed bistoury; a short silver catheter (No. 10 or 11 gauge), with elastic tube attached.

The patient is placed in lithotomy position, with the pelvis a little elevated, so as to permit the light to fall well upon it, and into the wound to be made. The staff is to be introduced with the groove looking towards the surface, and brought gently into contact with the stricture.

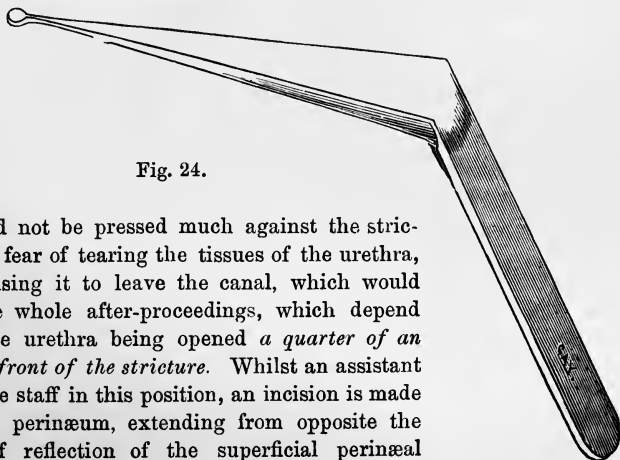


Fig. 24.

It should not be pressed much against the stricture, for fear of tearing the tissues of the urethra, and causing it to leave the canal, which would mar the whole after-proceedings, which depend upon the urethra being opened *a quarter of an inch in front of the stricture*. Whilst an assistant holds the staff in this position, an incision is made into the perinæum, extending from opposite the point of reflection of the superficial perinæal

fascia to the outer edge of the sphincter ani. The tissues of the perinaeum are to be steadily divided until the urethra is reached. This is now to be opened *in the groove* of the staff, *not upon its point*, so as certainly to secure a quarter of an inch of healthy tube immediately in front of the stricture. As soon as the urethra is opened, and the groove in the staff fully exposed, the edges of the healthy urethra are to be seized on each side by the straight-bladed nibbed forceps, and held apart. The staff is then to be gently withdrawn until the button point appears in the wound. It is then to be turned round, so that the groove may look to the pubes, and the button may be hooked into the upper angle of the opened urethra, which is then held stretched open at three points thus (Fig. 25), and the operator looks into

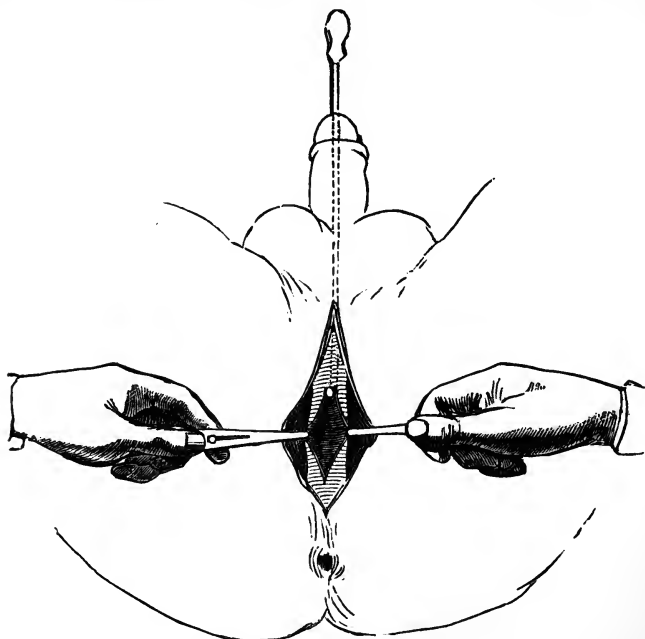


Fig. 25.—Staff introduced.

it immediately in front of the stricture. Whilst thus held open, the probe-pointed director is inserted into the urethra; and the operator, if he cannot see the opening of the stricture, which is often possible, generally succeeds in very quickly finding it, and passes the point onwards *through* the stricture towards the bladder. The stricture is sometimes hidden amongst a crop of granulations or warty growths, in the midst of which the probe-point easily finds the true passage. This

director having been passed on into the bladder (its entrance into which is clearly demonstrated by the freedom of its movements), its groove is turned *downwards*, the whole length of the stricture is carefully and deliberately divided on its under surface, and the passage is thus cleared. The director is still held in the same position, and the straight probe-pointed bistoury is run along the groove, to ensure complete division of all bands or other obstructions. These being thoroughly cleared, the

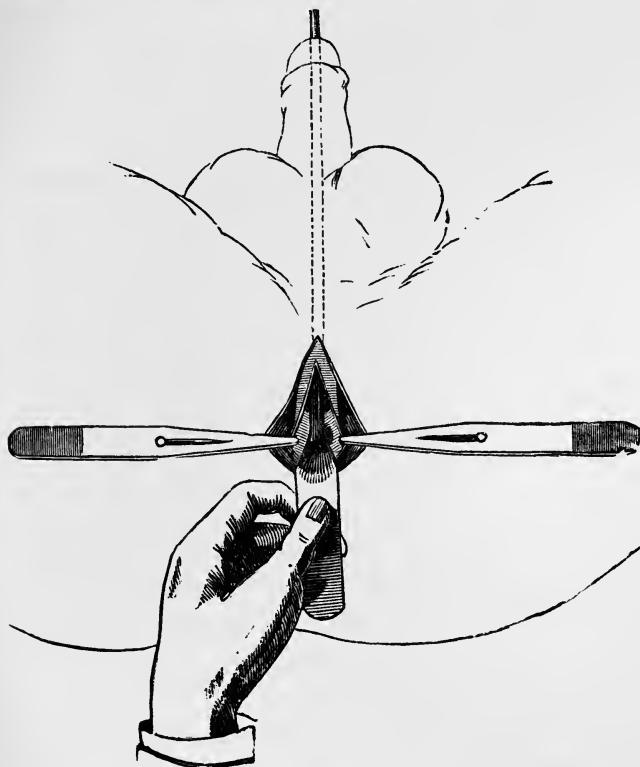


Fig. 26.

old difficulty of directing the point of a catheter through the divided stricture and onwards into the bladder is to be overcome. To effect this the point of the probe-gorget is introduced into the groove in the director, and, guided by it, is passed onwards into the bladder, dilating the divided stricture, and forming a metallic floor, along which the point of the catheter cannot fail to pass securely into the bladder. The entry of the gorget into the latter viscus is signalled by an immediate gush of urine along it.

The short catheter is now passed from the meatus down into the wound; is made to pass once or twice through the divided urethra, where it can be seen in the wound, to render certain the fact that no obstructing bands have been left undivided; and is then, guided by the probe-dilator, passed easily and certainly along the posterior part of the urethra into the bladder thus (Fig. 26).

The gorget is now withdrawn; the catheter fastened in the urethra, and allowed to remain for three or four days; the elastic tube conveying the urine away to a vessel under or by the side of the bed.

After three or four days, the catheter is removed, and is then passed daily, or every second or third day, according to circumstances, until the wound in the perinæum is healed; and, after the parts have become consolidated, it requires, of course, to be passed still from time to time to prevent recontraction.\*

*The Restoration of the Male Urethra.*—In some cases of central perineal fistulæ where all the urine is passed in this way, the anterior portion of the urethra being occluded, we have occasionally to consider the propriety of trying to restore the continuity of the entire canal, and to obliterate the fistulous opening. In making such an attempt, or declining it, we shall be guided by the special circumstances attending each case.

In one class of cases, there can be no doubt that persons live longer and happier micturating comfortably by a perineal opening, than they otherwise would do through a strictured urethra; they are less liable to kidney complications, and their urinary organs, already sufficiently damaged by long-standing disease, are not equal to the strain entailed by such operative procedures as would be necessary for establishing the continuity of the urethra and for keeping it in repair. On the other hand, we occasionally meet with instances where it does seem desirable that attempts to restore should be made. I can recall to mind instances where healthy persons have had entailed upon them a permanent central perineal fistula and an occluded urethra on the distal side of the fistula, as consequences of the

\* I am indebted to Mr. Wheelhouse, for allowing me thus to make use, not only of his paper, but also of his original woodcuts explanatory of the operation.

median operation for stone, and of operations rendered necessary by damage inflicted on the normal urethra by blows on the perinæum. I will illustrate the kind of case where it is proper to interfere, and the treatment I have found successful.

CASE.—A young man in excellent health, aged 24, was sent to me from a distance, with a central perineal fistula, the result of a median operation for the removal of a small stone from the bladder, which had been performed over two years previously. He both ejected his semen and micturated entirely through his perineal opening, into which, to keep it well patent, he occasionally passed a bougie on his own account. With this exception the parts were normal; there was no suppuration nor thickening. A bougie passed along the penile urethra came to a dead stop about half an inch, as far as I could calculate, from the line of another bougie passed by the perineal fistula into the bladder. The urethra, I therefore concluded, was occluded for about half an inch anterior to the commencement of the false route. Now here was a case where the parts were perfectly healthy, including all the urinary organs, and where the patient was most anxious that his passage should be restored. In this instance, my course of procedure was as follows. By the perineal opening, and into the bladder, I passed a large Key's lithotomy staff (straight). Turning it round so as to put the groove uppermost, I then passed a steel metallic bougie (No. 1, English) along the penile urethra down to the obstructed portion. Cautiously pressing on the end of this instrument through the obliterated canal, I made my way into the large groove in the straight staff; guided by the latter, the bougie was easily made to enter the bladder. In like manner, Nos. 2, 3, and 4 metallic bougies were then passed. Further proceedings were postponed for a few days, when the process was again repeated, with the result that, instead of a No. 4 English metallic bougie, the guide of a Maisonneuve's urethrotome was substituted. I then succeeded in completely dividing the floor of the obstruction. A Gross divulsor was then passed and withdrawn with the blades apart; in this way I satisfied myself that all obstruction had been removed. In proof of this, a full sized catheter could be passed along the whole of the urethra, from the external meatus into the bladder. By these means, the natural passage was thus opened up. To prevent urinary poisoning, a drainage tube was passed into the bladder from the perinæum, through which all the urine was discharged. Each day this was with-

drawn and a full sized bougie passed the whole length of the urethra. In the course of three weeks the drainage tube was removed, and in six weeks the fistula had closed, the patient urinating naturally. He was enjoined not to neglect passing a full sized bougie for himself daily for at least six months. When last heard of he was quite well, but still continued the use of the bougie.

There is a modification of this proceeding which I have also practised with success in a somewhat similar case, but where the scar tissue which occluded the distal urethra was much tougher. Having, as in the previous instance, made my way into the bladder, along the whole length of the urethra, and utilised a Key's straight staff, passed into the bladder from the perinæum, as a guide for this proceeding, I substituted, for a plain steel bougie, a small staff with a central groove on the convexity, such as we use for median lithotomy. Upon this I performed a median perineal section, or a Syme's external urethrotomy. Having by this plan thrown the two portions of the urethra into one unstrictured canal, the future management of the case was conducted in the same way as the one first narrated.

These cases are quoted at some length, not because they are isolated examples, but to illustrate the principles of treatment upon which reliance may be placed in suitable cases of this kind. The use of the drainage tube, until the new urethra is ready for the passage of water along it, renders the proceeding free from those dangers of urine absorption which are usually ushered in by rigors and fever. Where drainage is properly managed, no such symptoms need either be anticipated or feared. Of course, it will be noted that in cases coming under this category it is not necessary to supply the place of any tissue that has been lost by sloughing or otherwise. Plastic operations on the male urethra, except perhaps in the case of the penile urethra, where portions of flap may be taken and adapted from the contiguous prepuce or skin, have not in my hands yielded very satisfactory results. Fortunately, such proceedings are but seldom required.

Before concluding these observations, let me say a few words in reference to the application of subcutaneous surgery

to the treatment of stricture. Under favourable circumstances, a stricture may be divided from without subcutaneously. I have practised this treatment in a few instances with excellent results. It is limited, however, to penile stricture, where division can be effected without opening into the urethra, the obstruction being around the urethra rather than in it.

In a case of penile stricture in which I removed the urethra from a patient in the Northern Hospital, who died of acute rheumatism, I found, on dissecting up the mucous membrane, that its dimensions were in no way altered, the obstruction being entirely around it. Such a case would have been suitable for subcutaneous division. These are instances, as I have already explained, where the stricture-material has served the purpose of an encasing splint to a weakened or leaking canal.

I think the term "subcutaneous," as applied to the mode of operating described by Mr. Teevan,\* or that by Dr. Dick,† inappropriate, as the conditions are dissimilar to those we recognise in other forms of subcutaneous surgery; for instance, in tenotomy. In the description just referred to, the stricture is divided by a punctured incision through the perinæum, on a grooved staff, or a modification of it, passed through the stricture. Though the wound may be subcutaneous so far as the skin is concerned, yet inasmuch as the urethra is laid open, the section is exposed to the irritating influence of the urine flowing over it, or of the catheter that may (as in Mr. Teevan's case) be retained; hence it appears to me that such proceedings have no further advantage than those which belong to a properly performed internal urethrotomy.

As bearing upon the respective merits of two operations—namely, dividing strictures from within or without the urethra—the communications are of much value, and will be read with interest. I, however, share with Sir William MacCormac the

\* "Subcutaneous Urethrotomy," by Mr. Teevan; *Clinical Society's Transactions*, vol. viii.

† *Subcutaneous Division of Stricture*, by H. Dick, M.D.

opinion he seems to have expressed at the discussion following Mr. Teevan's paper, that the term "subcutaneous" was hardly applicable, however well devised the operation might be.\* For the reason that the operations referred to do not appear to me to present any advantages over an internal urethrotomy, it will be unnecessary further to allude to them.

Dr. Claudius H. Mastin, of Mobile, has recently described a method of treating some strictures by their subcutaneous division. Though I have not yet had an opportunity of testing this treatment, it seems to me to present advantages which may render it applicable to some of the more resilient forms of the disorder. I will therefore give a description of the operation, which I have no hesitation in commending to your attention, in the author's words† :—

I now desire to describe briefly an operation which I have employed since the year 1868, whenever an occasion has demanded an external section. Thus far it has proved entirely satisfactory to me, and especially so to those upon whom I have had occasion to perform it.

In the year 1872 I wrote a paper upon the result of my operations by this method, and since that date to the present, with an increased experience, I have seen no reasons to alter the views which were then expressed. I now claim nothing of originality for the operation, since it is based almost entirely upon the old *la boutonnière*, the incision being very small, and made anterior to the stricture; then, a very small probe-pointed director or whalebone guide is passed along through the stricture, and a delicate tenotome incises its upper wall subcutaneously; the small wound in the integuments is closed by pin sutures, and left to heal by primary union. Adhering to the maxim, "dilate where you can, cut where you cannot," I only resort to this operation in those cases where no catheter or guide can be made to traverse the urethra from the meatus to the bladder; cases which require some operation for the immediate evacuation of retained urine, and in which it is not possible for me to perform an internal urethrotomy. —

The patient, duly prepared by opening the bowels freely with an enema, and a hot hip bath given to tranquillise the nervous system, is placed upon a table, then secured in the ordinary position for cystotomy, and anæsthetised. I now pass down the urethra the tube of Benique

\* *The Lancet*, June 16, 1875.

† *Transactions of the American Medical Association*, May 1, 1886.

(Fig. 27), which is a plain silver tube open at both ends, about nine millimetres in diameter, and from six to eight inches in length; this tube protects the walls of the urethra, and puts on the stretch the face of the stricture. The tube is now filled with a bundle of small filiform whale-bone probes, which are carefully passed down to the stricture; by trying first one and then another it is possible that one may engage the opening



Fig. 27.

and pass on into the stricture. This being accomplished, I remove the disengaged probes together with the tube, and after securing the probe in the bladder, I pass over it a Wheelhouse staff which has been drilled through its end to answer the purpose of a Gouley staff, and carry it down to the stricture. It is now handed to the assistant, who holds it lightly, yet firmly, against the coarctation, whilst I open the urethra in the groove of the staff, making an incision about half an inch in length. I then draw outward the staff just sufficiently to enable me to find the whalebone probe as it passes through its end and on into the stricture; this I secure by passing a small blunt hook behind it, after which the staff is removed entirely from the urethra, and the distal end of the probe drawn out through the little wound which has been made; and now, over the probe I pass a little gorgeret (Fig. 28); this has its blade directed



Fig. 28.

upward, and being run along the probe, as its guide, it passes through the opening into the urethra, and then down the stricture, which is cut on its superior face. A catheter is now passed along the entire urethra into the bladder, and the urine evacuated, after which I carefully examine the site of the stricture with graduated metallic ball probes for the purpose of detecting any bands which, perchance, may remain; if found, they are divided by the retrograde urethrotome of Civiale, and the full calibre of the urethra restored.

In the event, however, that it is not found possible to pass a whale-bone probe in the first instance, so as to gain command of the stricture

before opening the urethra, I then pass either the staff of Wheelhouse, Gouley, or an ordinary staff of slight curve with deep groove, down to the face of the stricture, and practise the Leeds operation, with the exception that I do not rip open the whole stricture; but having gotten the whale-bone probe through the coarctation, I thread over it the little gorgeret and incise it on its superior face, just as described in the instance where the probe was passed along the tube of Benique, always taking care to sever any and all bands which may remain. This opening simply serves the purpose of shortening the canal and bringing us nearer the obstruction; it furnishes us a passage of only some few lines in length in which to manipulate our instruments, in place of a canal of several inches in extent, as would be the case if the urethra had not been opened. I thus virtually perform an internal section; I do not rip open the whole coarctated canal and lay bare to the external wound the cavity of the urethra, but I leave it, so far as the stricture is in question, just in the same condition as an urethra upon which I had done an internal urethrotomy.

In the absence of the little gorgeret, I have found a very narrow-bladed urethrotome of Maisonneuve, conducted by a small filiform bougie passed through the external opening and coiled within the bladder, to serve a most excellent purpose, provided the staff is grooved on its concavity, so as to insure the incision being made upon the roof of the urethra. Such, in brief, is the method I have adopted of operating *externally*, and find that it is easy of execution, and satisfactory in its results.

Having carefully divided any existing bands, and restored the lumen of the urethra, I then pass a sound into the urethra, and, after the slight oozing of blood has ceased, I wash the parts thoroughly with cold water, to which may be added either a chlorine or weak mercury solution, for the purpose of cleansing and disinfecting the wound. Now I close the wound accurately with two or three pin sutures, passed deep enough to engage the divided edges of the urethral canal, and, after coaptating the edges of the skin, I encircle the pins with a flat thread in the form of the figure 8; then the sound is removed, and its place occupied by a full sized catheter passed down to the prostatic urethra, but not into the bladder. The patient is put in bed and kept on his side, with instructions to push the catheter into the bladder when he has a call to urinate, and always, so soon as the urine has been discharged, to withdraw the catheter sufficiently far to get it out of the bladder, but not beyond the stricture. This catheter is used for only twenty-four to thirty-six hours, just long enough to insure the protection of the wound from the passage of the urine until it has been in a measure glazed over, and the strictured portion softened up by the presence of the inlying catheter. On general principles I am opposed to the *sonde à demeure* or retained catheter, and for obvious reasons too patent to need mentioning here; but the sound or catheter, used as I suggest, answers all the purposes for which it is intended, and keeps

the urine from the wound until it is sufficiently protected by a glaze which prevents the urine passing into the external incision. At the expiration of this time the catheter is dispensed with, and the patient left to pass his urine at will. About the fourth, or, at latest, the sixth day, I remove the pins, and do nothing more to the wound save keep up the dressing of lead-water and opium—which is applied immediately after the operation—for two or three days longer. Now the patient is permitted to get up and stir about, and within eight or ten days he resumes his former vocations. The after-attention is such as is usual in all operations for stricture, whether they be external or internal, viz., the systematic use of gradually increasing steel sounds until the maximum calibre attainable in the special urethra has been reached.

With this course judiciously pursued, I find that I am able to discharge my patients perfectly healed within from eight to twelve days; and in not a single instance, out of some twenty-five to thirty operations, have I had to contend with any hæmorrhage or the annoying complication of urinary fistula.

The advantages to be derived from this operation are—the short time of confinement for the patient, freedom from hæmorrhage, quick union by primary adhesion, and the small amount of resultant cicatricial tissue, which is always deposited in greater proportion the longer the healing process continues. The retained catheter for the first day or two does good rather than harm, since it protects the fresh incision from the toxic effects of the urine until it has become glazed over with lymph, and acts, at the onset, by pressure upon the divided stricture, compressing the vessels which have been divided and which might bleed after reaction; it also sustains the urethra as a splint, and prevents the stricture from reuniting until we have time to begin gradual and systematic dilatation with the steel sound. The comparative immunity from urethral fever which my patients have enjoyed after this operation, I feel certain, is due almost entirely to the use of the inlying catheter as I employ it. I do not desire it to be understood that I advocate the use of a retained catheter throughout the entire confinement of the patient to bed, but that I use it for only the first twenty-four to thirty-six hours—just sufficiently long to permit the wound to glaze over with lymph, and model, as it were, the granulations by gentle pressure.

## THIRTEENTH LECTURE.

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### SYPHILITIC STRICTURES—NUNN'S AND BELL'S VIEWS—CHANCRE OF THE MEATUS—CASES OF STRICTURE COMPLICATED WITH SYPHILIS—TREATMENT.

IN a paper read before the Medico-Chirurgical Society, in 1866, Mr. Nunn, of the Middlesex Hospital, pointed out that many cases of stricture were of a syphilitic nature, and required for their treatment the employment of those means which exercise a curative power over this specific disorder.\*

Though the pathology of venereal disorders was not then worked out as it is now, such a shrewd practitioner as Bell was not likely to be deceived in a matter of clinical observation. I have on several occasions had the opportunity of verifying the correctness of these views, and of recognising their value in the treatment of what, at first sight, appeared to be the worst forms of stricture, and I therefore consider it desirable that I should again draw attention to this complication. I do not refer to the puckerings consequent on the healing of venereal ulcers, which are usually met with at the meatus, but to the deposition, about the urethra, perinæum, or scrotum,

\* Mr. Nunn has kindly referred me to a passage in Benjamin Bell's *System of Surgery*, vol. ii, p. 221, fifth edition, where he states that "whatever may, in disorders of this kind, be the immediate cause of obstruction to the free passage of the urine, a venereal taint will for the most part be found to be the original cause of the whole. We have therefore desired that, at the same time the use of bougies is persisted in, the patient ought to be put upon a very complete course of mercury, in order to destroy every possibility of his suffering again from the same cause; for we need scarcely observe that, as long as any venereal affection continues to prevail, little or no permanent advantage can be expected from the use of bougies or any other remedy."

of the syphilitic exudation, which, becoming organised, often in considerable masses, impedes the dilatation of the canal. At first sight, from their extent and their extreme induration, these strictures present a most unfavourable aspect, but on diagnosing their nature, they eventually prove the most satisfactory to treat; thus again pointing us to the importance of recognising the constitutional origin of local disease.

I shall now proceed to illustrate certain forms of stricture having a syphilitic character, and to remedy which anti-syphilitic treatment must be resorted to. And, in the first place, I would observe that an ordinary chancre at the meatus may act as a stricture, and be mistaken for one. I have known this occur on more than one occasion, and dilatation with bougies attempted.

CASE.—Some time ago, I was consulted by a gentleman for what he was led to believe was a stricture of the meatus. His history was that some three months previously he had a chancreoid sore on his penis, which in the average time was healed by the usual remedies. The sore was considered to be of a local nature, and no secondary consequences were anticipated. Just about the time this sore was healing, an induration appeared at the meatus of the urethra, accompanied by a slight gleet discharge. This slowly but steadily increased until it involved about the last inch of the urethra. As the induration increased, so did the difficulty in making water.

Upon examination, I observed the scar of the first sore in the sulcus, which was soft and apparently non-syphilitic. The orifice of the urethra was almost completely occluded by an indurated mass, extending downwards for nearly an inch, and inverting the lips of the canal. I could pass through it with some difficulty a probe, and on squeezing the urethra a small quantity of thin watery discharge exuded. One or two glands in the groin were indurated, but not extensively. Though in some respects this case had the appearance of an ordinary stricture at the meatus, there could be no difficulty in arriving at the conclusion that the obstruction was caused by a chancre. I advised the discontinuance of local treatment by bougies, and that the patient should be put under the influence of mercury. In eight weeks the induration had almost entirely gone, and with it all difficulty in passing water.

The obscurity of diagnosis was in the sequence of the two forms of venereal sore—viz., the locally contagious and the infecting. I believe this to be an instance of double inoculation occurring at one time. The next case illustrates better the connection which occasionally exists between stricture and syphilis.

CASE.—In 1875, a gentleman consulted me for a stricture, which, he informed me, had been caused by an accident in the hunting field. From the description of the injury, it was clear that if his urethra had not been actually ruptured, it had been contused; I think more probably the latter. At the time of the accident he was suffering from undoubted secondary syphilis. For some weeks after the injury he experienced little or no inconvenience in passing water; he continued to take horse exercise, and paid no attention to the constitutional symptoms from which he was suffering. In the course of three months after the injury, symptoms of stricture appeared, and progressed rapidly, accompanied with induration behind the scrotum. When I first saw him the signs of stricture had extended over seven months. The scar of the syphilitic sore was still visible on the penis, and remained indurated. Two or three small glands in the groin were also enlarged and similarly affected. There was considerable induration to be felt in the perinæum, immediately behind the scrotum, and more so than appeared explicable by the injury he had received. I was consequently led to enquire closely into his history, with the result I have mentioned. Upon examining the patient with a bougie, I found that a No. 3 was grasped with considerable tightness. I came to the conclusion that the case was one of traumatic stricture, complicated with syphilis. I placed the patient under the influence of mercury, and commenced treatment by gradual dilatation. In the course of three months the induration in the perinæum, that was at first palpable to the touch externally, entirely disappeared, and a full-sized instrument could be readily passed. I should also state that the hardness alluded to in the cicatrix on the penis and in the glands also subsided under the influence of the mercury. The patient has since continued to pass a bougie for himself, and has had no further difficulty.

The third and last case I shall mention was under treat-

ment in the Infirmary, where I took the opportunity of drawing attention to the special complication.

CASE.—The patient had suffered from stricture, which he attributed to a gonorrhœa. For two years nearly the whole of the urine had been freely passed through a fistula behind the scrotum, but little escaping by the natural channel. The perinæum, scrotum, and the edges of the fistula were as hard as cartilage, a condition which I at first attributed to the irritating influence of the urine and the persistence of chronic inflammation about the parts. In this case I also found that the patient had suffered from syphilis about three years previously, and there still remained further evidence of the disease. The throat was deeply scarred, there was an induration in the centre of the tongue, and an indistinct thickening of the periosteum on one clavicle, and over the shin. The patient was a sailor, and, according to his statement, had never received any treatment for his syphilis. With this history before me, and seeing that no serious difficulty was experienced by the patient in passing his water, I resolved to rest content for the present with placing him under the influence of mercury. This was done and maintained for several weeks. Under treatment the patient improved in a remarkable manner, and the indurations disappeared to a very considerable extent. In eight weeks I commenced regular treatment by bougies, and before the patient left the hospital I had the satisfaction of finding the fistulous opening close, and the urethra capable of receiving a full-sized bougie.

I might further exemplify the connection that frequently exists between syphilis and stricture, but I think the cases I have recorded are sufficient for this purpose. There are forms of laryngeal stenosis which present conditions very analogous to what may be seen in the urethra as a consequence of syphilis. A good illustration of this will be found in a work recently published by Dr. Whistler,\* to which reference may be made with advantage by those interested in the point now under consideration. Not only in this illustration is the mucous membrane shown as corrugated and

\* *Notes on Operations in Syphilitic Stricture of the Larynx.*

roughened, but the syphilitic induration evidently involves the submucous tissue.

In some of these cases of syphilitic stricture of the urethra, where both the membrane and subjacent structures are alike involved in the hardened mass, I have not been able to do much until the channel of urine has been temporarily diverted by means of a perinæal incision. In this way, rest to the diseased part being insured, it has been found that absorption took place under anti-syphilitic treatment, and the function of the canal was again completely restored. We have had several illustrations of this, but it is hardly necessary to narrate them in detail. My reference to syphilis has for its special object the reminding you of its occasional occurrence as a complication of stricture, under such circumstances as I have endeavoured to illustrate, and my remarks as to special treatment will be exceedingly limited.

Where the syphilitic taint exists, excepting in the case of some forms of its tertiary stage, the patient should be brought under the influence of mercury, which is to be maintained until all traces of the infection, constitutional or local, have ceased to exist. There is no other drug upon which reliance can be placed. The outcry that one occasionally hears in reference to mercury is a relic of bygone days, when its abuse was thought to be its use, clinical observation then falling far short of the precision which now obtains. Some most important investigations have recently been made bearing upon the tonic influence that mercury is capable of exercising. Most of us must frequently have observed how persons improve in condition, gain weight, and become sleek under its action.

Dr. Keyes, of New York, has paid considerable attention to this subject, and demonstrated, I consider, in a most conclusive manner, "that mercury in minute doses is tonic in all cases where it can be digested, in syphilis, or out of it, continued for a short or a long (over three years) time."

By some carefully conducted observations, and the use of

the hématemètre, he has shown :—"That syphilis diminishes the number of red corpuscles below the healthy standard. Mercury in small doses, continued for a short or long period in syphilis, alone or with the iodide of potassium, increases the number of the red corpuscles in the blood, and maintains a high standard of the same." \*

Such are the effects of mercury we wish to obtain. Where syphilis occurs as a complication of stricture, I prefer commencing the mercurial treatment by a course of inunction. It is, I know, somewhat old-fashioned, but experience shows us that it has many advantages, one being the readiness with which you can control its effect on the system. Do not suppose that I recommend inunction in the manner that appears to have been practised so late as the time of Sir Astley Cooper, who, in denouncing its abuse, speaks of its "exhibition," as the old phrase goes, producing "three pints of saliva a day." † No wonder that the remnants of prejudice still exist.

Inunction may be employed either by means of the mercurial ointment rubbed into the thighs, or the oleates of mercury, which are convenient and suitable, the amount of mercury in them varying, as may be required, from five to twenty per cent. Anything like an excessive action should be avoided, the object being to accomplish what is required with as little disturbance to the patient as possible. Salivation is under all circumstances to be deprecated. If any further evidence of the value of inunction in the treatment of syphilis were necessary, I could refer to the extended experience of Dr. Brandis, of Aix-la-Chapelle, under whose advice it is so largely employed in connection with the natural resources of this fashionable retreat.

When inunction is impracticable, either from the patient being unable to resort to it, or from the effect produced by the mercurial ointment on the part to which it is applied, I prefer

\* *The Tonic Treatment of Syphilis*, by E. L. Keyes, M.D. New York, 1877.

† *Lectures on Surgery*, 8th ed., p. 448.

the perchloride or the proto-iodide of mercury, the latter being advantageously combined in a pill, with a little Dover's powder to prevent purging.\*

Local treatment, usually by dilatation, will also be necessary, and it is astonishing to note how easily this proceeds as soon as the system becomes conscious of the presence of mercury. I have tried smearing the bougie used with mercurial ointment, but without advantage; the amount so introduced is not sufficient to be of any avail, whilst it is sometimes found to irritate the urethra. For the same reason, I do not employ urethral pessaries, preferring to produce the general effects of the mercurial, which really is all that is required, by one or other of the plans usually adopted for this purpose.

In these cases, whenever the obstruction is relieved and the urgency of the distress is over, let the patient be induced for his own safety to continue anti-syphilitic treatment until all signs of the constitutional disorder have disappeared. There is nothing to be feared from the judicious employment of mercury for the time that is necessary to destroy the effects of syphilis, whilst there is everything to be apprehended from a disease which, if uncontrolled, is sure to follow its own morbid inclinations.

\* An excellent paper, containing an account of the various modes of administering mercury, by Dr. J. Duncan, appears in the *Edinburgh Medical Journal* 1877.

## FOURTEENTH LECTURE.

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### CONSEQUENCES OF STRICTURE—URETHRAL ABSCESS—EXTRAVASATION OF URINE—ABSCESS IN RELATION WITH THE URETHRA.

I SHALL now proceed to consider some of the consequences that urethral stricture may occasion. Of these, abscess in immediate relation with the place of obstruction and extravasation of urine, are amongst the commonest.

A person who has been suffering from stricture for some years, and has probably given it but little thought or attention, one day finds some swelling in the perinæum, immediately behind the scrotum, and, perhaps, partly involving it, of a brawny hardness. Micturition is usually conducted with much difficulty and straining. After the swelling has been in existence for some two or three days, when making an effort, possibly for the dozenth time in a few hours, to pass water, he is conscious of something yielding or giving way, and this is followed by a fancied or real relief at the view that the obstruction has been overcome, an idea which may be favoured by the discharge from the penis of a little blood-stained or purulent urine. But this hope is not of a long duration, for under the renewed efforts to pass water he notices that the scrotum, and afterwards the penis, commence to swell in a sudden and, to him, most remarkable manner, accompanied with a sense of skin-tingling, which naturally increases his alarm; nor is he now able to pass a drop of urine. Under such circumstances are we often summoned to see a stricture case urgently, and perhaps for the first time.

I will now briefly pass in review what has taken place, and what the consequences will probably be if surgical assistance is not promptly and decidedly rendered. Under the constant irritation caused by the pressure of urine at the point of obstruction, the lacunæ and urethra become dilated behind the stricture. These changes chiefly involve the floor of the canal; in this position urine of an offensive character constantly lodges in small quantities; this occasions a peri-urethral abscess, which, as I have already said, makes itself prominent in the perinæum as a hard, brawny swelling; and, eventually the contents of this inflammatory abscess-swelling make their way into the urethra behind the obstruction. This escape of matter, probably only a few drops, is followed by an increased sense of irritability, and under a renewed effort to micturate the urine is forced, first into the perinæum, then into the scrotum, penis, and abdominal parietes, the direction being determined by the connection of the fasciæ, as will be seen by a reference to fig. 7. If the patient does not receive one kind of relief, the result is that wherever the urine wanders the tissues in contact with it, muscles, skin, and cellular tissue rapidly become gangrenous, and the patient sinks; if, on the other hand, prompt assistance of such a nature as I shall presently notice is forthcoming, good hope of recovery, unpromising as things may look at the time, may be entertained. Of all the more serious forms of urinary disorders that I have been called upon to treat none has given me greater satisfaction than those at present under notice. I have frequently observed that the intervention of abscess and limited extravasation of urine, and the treatment these have received, have eventually resulted in a patient exchanging a very bad stricture for an easily manageable one. I could furnish several examples of this. There is something to be learnt in the treatment of stricture from this pressing and undoubtedly serious complication. The appearance presented by the parts is sometimes very remarkable: the perinæum is swollen and brawny, and seems to run

into the scrotum imperceptibly, which is intensely œdematous, varying in colour from pink to black, according to the length of time that has elapsed since the urine was extravasated. The penis is generally so swollen that it is almost impossible, where there is a prepuce, to get a sight of the meatus or an instrument into it until an exit has been made for the fluid it contains. This is the course of events where the stricture is situated in the sub-pubic portion of the urethra. When the stricture is in the penile portion of the canal, the order of proceedings is reversed; that is to say, extravasated urine will find its way, first into the penis and then into the scrotum. This I have seen on several occasions. The treatment of abscess and extravasation of urine, from whatever part of the canal it may proceed, must be prompt and decided, otherwise irreparable damage is done, and the chances of recovery proportionately lessened. No half measures will suffice. The patient must be put under an anæsthetic, on a table, or where he can be conveniently placed in the lithotomy position.

Before proceeding, we must be quite clear as to what objects we have to fulfil; the first, is to provide channels of escape for the confined urine, wherever this may be; and, secondly, to establish a direct communication with the bladder behind the stricture through the perinæum, provided, of course, the obstruction is in the usual position, namely, in the sub-pubic urethra. In the first place, it will be as well to see if a catheter or grooved staff can be passed into the bladder; this is generally possible, for the bladder is now much in the same condition as if it had been aspirated, tension is taken off the stricture by the escape of the urine amongst the tissues, and, as a rule, with a very little trouble an instrument of some kind, which may act as a guide, will find its way into the bladder. The practitioner should not forget that he may be passing his instrument into a now empty and contracted bladder, otherwise he may possibly feel a little embarrassed at not seeing urine escape. Under these circumstances] the urine must be looked for amongst the

tissues, and not in its usual position. Having determined whether an instrument will pass or not, we next proceed to deal with the extravasated and confined urine. Usually a couple of long incisions on either side of the raphè, going down into the œdematous tissues, will suffice for the scrotum, and the same for the penis if swollen. When this has been done, the parts should be taken within the grasp of the hand and well pressed, just, in fact, as you would squeeze out a wet sponge; by this plan a large quantity of confined urine is got rid of, sloughing is prevented, and the parts are reduced to something like their normal dimensions. Wherever else urine has shown itself to have travelled, by the swelling and sort of crackling that may be felt by the hand, incisions must be made into the cellular tissues. Any spurting skin-vessels may be tied, but there is usually no hæmorrhage, for as the urine escapes by the wounds the tissues begin to contract.

We must now proceed to fulfil the second indication, and make a direct communication through the perinæum with the urethra behind the stricture, assuming, as I have said before, the obstruction occupies its common position.

When I am doing this I like always, where it is possible, to deal with the stricture at the same time. So long as you have a good direct communication with the bladder behind the stricture, experience has shown me that it is the best course to deal with the stricture at once, and save further trouble. If I can only get a small staff or catheter into the bladder, I make it my business either to introduce my stricture-stretcher and at once bring up the urethra to a No. 12 English, or a Maisonneuve's urethrotome if the channel is small, and so divide everything that obstructs. I can then put in a large staff. Upon this I make a sufficiently free perinæal urethrotomy to pass one of my drainage-tubes into the bladder. My object is not only to make a direct opening by the membranous urethra into the bladder for drainage purposes, but to free the urethra in its whole length from all obvious causes of obstruction.

A word or two in reference to those cases where, under the circumstances I have taken, the practitioner finds it impossible to pass an instrument or guide into the bladder. How is he to fulfil the second condition connected with the treatment of these cases upon which I have laid stress. As a rule, the place where the urethra has given way is within a very short distance of the point where the catheter or staff is obstructed, upon this point and with this as his guide he should cut along the median line of the perinæum with some freedom. If he will then introduce his finger and carefully feel about he may often detect the line of the urethra, and by the use of his finger-nail insinuate a way along it into the bladder. I have done this several times and seen it done; all I can say is, that for many years I have never experienced much trouble in putting a drainage-tube into the bladder from a perinæal section independently of whether I have been able to pass a guide or not. It seems easier to do this in cases of abscess and extravasation than where it is undertaken for the treatment of an impassable though pervious stricture. I know it is the practice of some surgeons to trust merely to a central perineal incision as affording a sufficiently reliable vent, without demonstrating, either by the introduction of the finger or a drainage-tube from the wound into the bladder, that the communication is both direct and free. However, where a drainage-tube can under these circumstances be put into the bladder without much trouble it is I believe better; when the passage cannot be readily made it is wiser to trust to the incision alone than to incur risks which must obviously be connected with too much digital or instrumental searching. The position of the opening in the urethra behind the stricture through which the urine has escaped may sometimes be determined after the perinæum has been opened by making pressure above the pubes, when urine may be seen to escape into the wound; this often proves an important guide.

These two conditions being fulfilled, it is astonishing how rapidly convalescence sometimes takes place under these circum-

stances. If there is a good drain there are no rigors nor fever afterwards. Though the details connected with the treatment of these cases which you have seen carried out in hospital practice appear comparatively simple where you are surrounded with so much that contributes to success, you will sometimes find them exceedingly difficult to carry out to your satisfaction under circumstances which the general practitioner has occasionally to face. In a case I attended in consultation with Dr. M. J. Campbell, we had to do all I have described, including placing the patient under an anæsthetic, and groping my finger without a guide into the bladder for the purpose of putting in a drainage-tube, with two elderly females for assistants in holding the patient in the lithotomy position as well as the necessary candles. What seems smooth on paper is often found to be very awkward in practice. I refer to this case because it reminds me of what I said before, that abscess and extravasation sometimes effects a very marked change for the better in the circumstances of an individual who is suffering from a bad stricture. The patient just referred to made an excellent recovery, and remains well as an officer on board a steamship, under the supervision of my friend, Dr. Fourness-Brice.

That urine may occasionally be extravasated without causing destruction of the tissues with which it is in contact, is referred to in connection with a case narrated in my lecture on the examination of the urine, where there was a marked absence of urea, leading to the inference that the destructive power of retained urine on the tissues is through the generation of ammonia by the decomposition of its urea. In practice, however, when urine is extravasated, we draw no such fine distinctions, it being the duty of the surgeon to provide channels for its escape, and so prevent that inevitable destruction of tissue which, almost without an exception, follows.

There is one sign in connection with extravasation which is usually regarded as fatal. Brodie states : \* “ Sometimes a

\* Brodie on the *Diseases of the Urinary Organs*, p. 14.

black spot may be seen on the glans penis; it is a most fatal sign, for I never knew one to recover in whom it appeared. It indicates that the urine has been effused into the cells of the corpus spongiosum." I have seen two examples of this, in each instance with a fatal result.

Extravasation of urine, when it occurs in young children, is almost invariably due to the impaction of a calculus in the urethra; in one case I saw, the extravasation was due to an extremely contracted phimosis. Impacted calculi have in this way caused very extreme damage, the urine spreading into the cellular tissue of the scrotum and abdomen, and producing the same effects as occur in the adult. The principles of treatment are the same: remove the obstruction in the urethra, and make artificial channels for such urine as may have passed amongst the tissues.

I have more recently met with instances in male children where this symptom was directly due to the sudden blocking up of the urethra with portions of membrane and caseous matter thrown off from a tubercular bladder or kidney. In one case in the Infirmary, where I had to open the perinæum for extravasation of urine in a boy fourteen years of age, who was placed under my care by Dr. Fleetwood, I feel sure the retention, ulceration, and subsequent extravasation were caused by the urethra becoming suddenly impacted with tubercular debris.

Such symptoms warrant the performance of perineal section, not only for the purpose of affording immediate relief, but to permit of the discharge of cast-off materials from the bladder or kidneys, which, by reason of their bulk, cannot find a ready exit along the natural passage.

In the case of an adult I recently examined in consultation at the Bootle Borough Hospital, one of the largest calculi I ever saw of the kind had made its escape in this manner. The patient was admitted under the care of Dr. Wills, with a sloughing scrotum and extensive extravasation of urine. The latter was relieved by incision, and from the scrotum, amidst a

sloughy mass, a phosphatic calculus, weighing eighty grains, and moulded to the shape of the prostatic portion of the urethra, was removed. This, undoubtedly, had been the cause of all the trouble. The patient made a good recovery. An examination of this calculus shows that it must have been in the urethra for a considerable time before it gave rise to serious symptoms of obstruction, as the wave-like lines of the formation indicated the probable increase of the stone by success phosphatic depositions as the urine flowed out.

In the future management of these cases of extravasation it is most important that the strictest cleanliness should be insisted upon. Where there is much sloughing the wounds are necessarily offensive, and great care is required to keep them sweet. They should be syringed out regularly with tepid carbolic lotion, of the strength of one part of acid to eighty of water. In using carbolic acid in the local treatment of urinary affections, it is well not to have the solutions, be they oil or water, too strong, or they may occasion discoloration of the urine, which, though unattended, so far as I have seen, with any ill effects to the patient, is apt, under these circumstances more especially, to create some alarm. Charcoal poultices are the best application during the separation of the sloughs, and, after this, water dressing, or some slightly stimulating lotion. In all these cases I have the patient well packed between the thighs and elsewhere with picked oakum, such as is generally used in hospitals. It assists in disinfecting, and the tarry smell is not a disagreeable contrast to that which is exhaled by wounds and suppurations of an urinous nature. Where there has been much destruction of the scrotum, advantage may be gained, after the sloughs have separated, by drawing the parts together with strapping. It is of importance to syringe out the anterior portion of the urethra, by the external meatus, frequently. The fluid escapes by the perineal wound. In this way the future condition of the urethra and divided stricture may be much improved.

In insisting upon the strictest attention to general hygienic measures, it must be remembered that septicæmia and pyæmia are the more frequent causes of death after these operations. That sickly urinous smell which so often hangs about the apartment and appurtenances of the urinary invalid is not uncommonly due to a want of cleanliness on the part of the patient or his attendant. One of Taylor's disinfecting apparatus put into the bed will be found very useful for this purpose. The ventilation of the apartment must be carefully seen to; remembering that cold, by checking the action of the skin, invariably increases the distress of the patient suffering from an urinary complaint. Where there has been much damage done by extravasated urine, the patients are apt to pass into a low typhoid state; and when the pulse and dry state of the tongue indicate this, stimulants and highly nutritious fluid foods are required. In one or two of the cases recorded the danger from this condition was great. The nervous irritability which is so frequently observed in these cases I have found best relieved by small doses of morphia hypodermically administered.

My remarks hitherto have had reference to abscesses connected with stricture. Abscess may occur independently of a stricture in any of the tissues in relation with the urethra. It may be caused by such irritants as the gonorrhœal discharge, improper injections, or the passage of instruments along the urethra. When there are signs of local inflammation, means should be taken, by the employment of leeches, fomentations, and other emollients, to procure resolution, but there must be no hesitation in giving escape to matter should there be indications of its formation. Unless this is promptly done, it may burrow into the urethra and damage may result.

I have already stated, in my lecture on the anatomical relations of the urethra, that inflammatory exudation, when it occurs round the membranous portion of the urethra and between the layers of the fascia in connection with it, sometimes gives rise to the impression that abscess of the prostate is

impending. I believe that a suppurating prostate is an affection far more rare than the text-books would lead us to believe. A careful examination of the rectum, with the index finger feeling the prostate, and the thumb of the same hand on the perinæum, is the best way of determining the position of inflammatory exudation in this part, and so of avoiding the error I have referred to.

Where there is no stricture, and the exudation around the urethra is not sufficiently pressing to cause retention of urine, the surgeon's endeavours to procure resolution may with safety be prolonged until the existence of pus is distinctly indicated by the sense of fluctuation. The occurrence of a rigor may not indicate much ; it is often observed that a very slight interference with the act of micturition is sufficient in some persons to produce this symptom.

Where there is a stricture with retention of urine, it is proper rather to anticipate the formation of matter in an inflammatory swelling in relation with the urethra, inasmuch as the propulsive efforts of the patient, added to the tension already thrown on the urethra by the inflammatory peri-urethral exudation, may result in that rapid ulceration of its walls which so often precedes extravasation of urine. The distinction I have thus endeavoured to draw has not unfrequently enabled me to depart from that rule in surgery which renders imperative the early incising of inflammations in proximity with the urethra. In opening an abscess in the perinæum, the result of gonorrhœa or such-like irritations, where there is no stricture causing retention, care must be taken not to open the urethra, as this procedure introduces an unnecessary element of danger, from which a simple perinæal incision is free ; for even if, under these circumstances, the abscess should by ulceration make its way into the urethra, all risk of extravasation is avoided by the opening which has been made.

## FIFTEENTH LECTURE.

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### RUPTURE OF THE URETHRA.

RUPTURE of the urethra, either partial or complete, is an injury of a serious nature, as it exposes the patient to certain immediate risks arising out of retention of urine under circumstances where catheterism is sure to be difficult, if not impossible; and further, it lays him open to the likelihood of having a stricture of the worst and most unmanageable kind.

This injury is usually caused by blows on the perinæum or adjacent parts, such, for instance, as are incurred by falling from a height astraddle, or by kicks; in fact, by any violence applied over the line of the urethra. Not unfrequently, it is occasioned by horsemen being thrown suddenly forwards and striking the sub-pubic region with the pommel of the saddle. I have known it happen in the same way by a fall on a bicycle. Surgically, it may arise out of the use of instruments applied to the urethra, and by the lodgment of calculi within the canal.

In investigating injuries involving the parts constituting the neck of the bladder, in which I include the membranous urethra, I have experienced difficulty in satisfactorily explaining how it was that the membranous urethra was sometimes ruptured without fracture of the pelvis co-existing, whilst there was no evidence that the perinæum had ever been struck. In treating of rupture of the urethra, Bryant refers to the point in the following words:—"In not a few instances the injury (ruptured urethra) has been produced by the passage of a cart wheel across the pelvis. It is somewhat difficult to understand how such a result can be produced by such a cause, unless

some fracture of the pelvis co-exists; but explain it how we may, in practice we meet with cases of ruptured urethra following upon the passage of a wheel across the pelvis, and unconnected with any other symptom of its fracture.”\*

In some instances of ruptured urethra I have seen in young subjects, where the force has been applied to the sides of the pelvis, as in crushes and squeezes, and not to the perinæum, as is more commonly the case, I feel convinced that the tearing of the urethra more or less across is occasioned by the bowing or bending forwards of the pelvis at the symphysis pubis under pressure applied to the sides. In this way, by the sudden elongation of the antero-posterior diameter of the pelvis the urethra is put on the stretch, and gives way at or about the point where it passes through and is fixed to the deep triangular ligament.

The nature of the case is generally made out by blood escaping from the meatus of the urethra, and by inability to urinate. In connection with the symptoms of this injury, I cannot help remarking that I have rarely seen extravasation of urine to any appreciable degree follow immediately upon it. Where the laceration is at all extensive, or where the canal is entirely torn across, retention is complete. What the end of this would be if the case were to remain unrelieved, I cannot say from personal observation; I suppose the urine would eventually become extravasated amongst the tissues adjacent to the point where the tear was, rather than the bladder be ruptured by the distending force from within. As a rule, in these days, professional assistance is obtained before such a contingency can arise. Mere contusion of the urethral walls must not be confounded with rupture; this may follow a blow; there is retention; a catheter is used; no unevenness in the canal can be detected as the instrument passes, and in forty-eight hours or so, under these circumstances, the parts resume their normal function.

\* *The Practice of Surgery.*

In connection with the anatomical arrangement of the fasciæ in relation with the urethra and bladder, Dr. Barron remarks:—"It is to be noted how easy it would be, in a case of ruptured urethra involving either the whole circumference of the tube, or its anterior aspect only, to pass a catheter into the pre-vesical space, and finding the point quite free and movable, and no urine being discharged, to suppose a ruptured bladder."\* I have known this happen in practice, and occasion very considerable embarrassment to the operator.

I will now proceed to narrate a few cases which are selected as illustrating points I desire to make prominent in connection with the treatment of this injury.

CASE 1.—A labourer, aged 20, was admitted into the Northern Hospital under my care in August, 1866. Eighteen hours before admission he had received a kick on the perinæum. Blood issued from the orifice of the urethra, and he shortly afterwards found himself unable to pass water. For this he applied at the hospital. With some difficulty a No. 7 catheter was introduced, a distinct laceration being felt about the bulb. Two pints of bloody urine were removed, and the catheter was then retained in the bladder. No further difficulty was experienced. The patient made a good recovery. A contraction about the lacerated part ensued, and for several months the patient attended as an out-patient for the purpose of having the urethra dilated by bougies. Eventually he was lost sight of, some contraction then remaining.

CASE 2.—A dock labourer was admitted into the Northern Hospital under my care in 1866, having fallen from a height astride over some scaffolding. On admission the perinæum was bruised, and blood was passed by the urethra. On introducing a catheter, a rupture of the urethra, about the triangular ligament, was made out. The laceration did not appear completely to sever the urethra, for with a little trouble the catheter was introduced into the bladder. In this position it was retained, and up to the fifth day the patient appeared to make satisfactory progress. On this day, however, the patient became feverish; the perinæum was found swollen, and there was much pain about the part. Under these circumstances I opened the perinæum freely,

\* "Arrangement of the Pelvic Fascia," *Liverpool Med. Chir. Journal*, January, 1885.

dividing the urethra forwards from the apex of the prostate. Vent was thus given to disorganised clots and some fœtid pus, and a certain amount of immediate relief was afforded. On the ninth day from the injury there was a rigor, and the patient rapidly succumbed, with well-marked symptoms of pyæmia. I was only able to inspect the injured part after death, when I found that the urethra had been almost completely, though irregularly, ruptured in the membranous portion. There were also signs of rapidly extending pelvic cellulitis.

CASE 3.—About the same time as the previous case, a sailor was under my care at the Northern Hospital for very similar injuries caused by falling across a rope. Here the signs of a rupture of the urethra in its deeper part were equally unequivocal. With some difficulty I introduced a grooved staff, and freely laid open the perinæum and urethra to an extent sufficient to secure a free vent for the urine. The patient made a good recovery, and the perinæal wound completely healed. During the healing process bougies were regularly introduced. I saw the patient not long ago, and he appeared to suffer no inconvenience from his accident. The urine was voided in a natural stream.

CASE 4.—A 'bus conductor, aged 17, was admitted into the Infirmary under my care in 1869, with the following history. Seven days before admission he was kicked on the perinæum; this was followed by slight hæmorrhage from the urethra, but he was able to pass his water. On the day of his admission to the Infirmary (the seventh from the accident) the hæmorrhage recurred, and he had retention of urine. A No. 9 catheter was introduced, and a considerable quantity of urine withdrawn. Two days after this he became feverish, the perinæum was swollen, and there was some pain about the part. To relieve this a free incision was made into the urethra along the central raphé, through which all urine passed. This was followed by relief. He made a good recovery, and left the Infirmary with the perinæal wound completely closed. The urethra appeared to be lacerated about the membranous portion along its lower wall. During the process of healing, bougies were introduced in increasing sizes. He left the hospital with a urethra admitting a full-sized bougie, and I never heard afterwards that he suffered from stricture.

CASE 5.—A stonemason was admitted into the Infirmary under my care in 1870. He had fallen across a sharp stone, considerably bruising his perinæum. On his admission he had the usual symptoms of lacerated urethra—viz., blood issuing from the orifice of the

urethra, and retention of urine. A catheter disclosed a considerable rupture about the deep perinæal fascia. I accordingly laid open the perinæum freely in the middle line, giving exit to clots and forming a passage for the urine to escape. The patient had a rather sharp attack of orchitis, but with this exception made an excellent recovery. The treatment consisted in the regular introduction of bougies whilst the perinæal wound was healing. When he left the Infirmary the wound was closed, and the urethra of its natural size. I saw him some months afterwards, and he had remained quite well without any sign of stricture.

In reference to the question of treatment, the cases I have recorded justify a conclusion that in all such injuries external incision, or, as it is more commonly called, perineal section, is the safest plan of proceeding, recommending itself on the following grounds :—

1st. Because of the impossibility of accurately determining the extent and direction of the laceration.

2nd. Because incision is the surest means of preventing extravasation of urine.

3rd. Because incision diminishes the risk of a stricture forming, or, at all events, moderates the severity of such a formation ; and

4th. Because the risk of poisoning by toxic urine is materially diminished.

The relative position of a laceration to the deep perineal fascia is a matter of the first importance. Were it possible in all cases to ascertain that the lacerated portion was anterior to the deep fascia, provided a catheter could be introduced into the bladder, it might by some be considered safe to treat the injury without incision, resorting to such a proceeding should signs of extravasation of urine appear ; for, under these circumstances, the direction taken by extravasated urine is forward towards the scrotum, where it renders itself unmistakably apparent from the moment of its occurrence. Where the laceration is behind the deep fascia, the extravasation, should it

follow either immediately or in the course of a few days, is of a much more serious nature, inasmuch as the urine takes a backward direction towards the pelvis, setting up cellulitis, which speedily goes on to suppuration. Here it is much more subtle; it may be going on from the moment of the injury, not declaring itself until it has occasioned symptoms of pelvic cellulitis.

The former variety of extravasation is usually amenable to treatment, but the latter is most frequently followed by a fatal result. Case 2 illustrates this, and Case 4, though the patient was saved, undoubtedly is a similar example. Inasmuch, then, as the precise position of the laceration, whether it be a few lines in front of the deep fascia or a few lines behind it, determines in a great measure the after-consequences, so far as suppuration is concerned, is it not better to act on the safer side in these cases of deep laceration, and anticipate the risk of retrograde inflammation?

The second proposition, that incision is the safest means of preventing extravasation, naturally follows on admitting the impossibility of precisely determining the position of the injury to the deep fascia. No other plan than that of opening up the injured spot, and thus forming a direct course for the urine to escape, can be relied upon. In instances where the urethra is completely torn across it is usually impossible to introduce a catheter, and here, under all circumstances, the line of action is evident enough. It may be objected that where a catheter can be introduced incision is unnecessary, but it must be remembered that the constant presence of such an instrument in the bladder is no safeguard whatever against the occurrence of extravasation, whilst its continual pressure on the swollen and inflamed urethra at the part injured is likely to be followed by sloughing of the canal and a proportionate extension of any subsequent stricture.

In reference to the third conclusion, that incision diminishes the risk of stricture, or moderates the extent of such a formation, it may be stated generally that the worst forms of stricture

are commonly those following laceration of the urethra; and when we consider the circumstances under which such wounds heal where no artificial vent is provided, this is not to be wondered at. The wound in the urethra is of a more or less lacerated character; it heals under the irritating influence of constant contact with urine, and an inordinate amount of plastic exudation is usually thrown out around the wound. On the other hand, in cases where the urethra when lacerated is opened by perineal incision, we have still the original injury, but the circumstances are more favourable for limiting action. Free vent is here given for all matters of an irritating nature, and the exudation lymph is merely sufficient for coating over the incised tissues. That stricture need not necessarily follow rupture of the urethra I have no doubt.

In reference to the fourth conclusion that perineal incision diminishes the risk of the patient being poisoned by toxic urine. What I mean by this is that his chance of dying rapidly with physiological symptoms of poisoning by some urine-combination absorbed by the wound is thus reduced to a minimum. Let me give an illustration of this, to which I could add several others:—

CASE.—On August 4, 1886, I was asked by Dr. E. T. Davies, of Shaw Street, to see a boy, aged 11, with him late at night. The history of the case was as follows.

About thirty hours before I saw him he had fallen astride some sharp curb-stones, and there could be no doubt that he had sustained a rupture of the urethra, though he did not complain until the following morning, when he was seen by Dr. Davies, who at once suspected that something of this kind might have taken place. The boy stated that he had passed water, but on the doctor asking him to do so in his presence he was found to be unable. There was no sign of injury to the perinæum, but a little blood was escaping from the penis. Catheterism having been tried later on, I was asked to see him that evening. He seemed very well in himself, but he had a distended bladder, and could pass no water. With some little trouble I managed without force to slip a No. 5 elastic catheter into the

bladder, in doing which I recognized the nature of the injury. About a pint and a-half of highly blood-stained urine was removed, the catheter was tied in and the patient put to bed.

On the following morning he was visited by Dr. Davies, who found that he had had a restless night, a good deal of pain, and a temperature of 102 F. The bladder was washed out with warm water. About four o'clock the same afternoon Dr. Davies was hastily summoned and found the patient in severe convulsions and absolutely unconscious. The temperature was 105°; the catheter which had been draining freely throughout the night was removed. He could not swallow, the fits recurred with much violence, attended with opisthotonos, and he became comatose and died at midnight, that is to say, about twenty-four hours after I saw him and the catheter had been tied in.

Though at some previous date the patient appears to have suffered from difficulty in breathing, for which Dr. Davidson and Dr. F. Semon had been consulted, at the time of the accident he was in good health. Dr. Davies observed that though the flow of urine *through* the catheter was free, yet quite as much escaped along the canal by the side of the instrument. When a convulsion was on the urine was squirted out both through and by the side of the catheter; there was no retention from the time the instrument was introduced up to death. Dr. Davies observes: "When in actual convulsion the pupils would contract to pin-point size, and when out of the fit would dilate immensely, so that the corneæ were absolutely obliterated." An hour before his death he had a temperature of 104° F. Unfortunately no *post mortem* could be obtained.

This case does not stand alone in my experience, it was I believe one of poisoning by toxic urine. This is a point which I have so fully discussed in a previous lecture that I shall not further allude to it; suffice it to say, that I am sorry I did not do what I have urged here, that is to say, perform a free cystotomy, and allow the urine to run out just as it does after a lithotomy. I have never regretted doing this. As the case stands does it not closely resemble those exceptional instances where death has rapidly followed the passing of a bougie for stricture?

Longitudinal incisions of the urethra are not ordinarily

followed by stricture. We have an illustration of this in the operation of lateral lithotomy, where the formation of a stricture following the incision into the urethra is a rare event, and when it does occur, is probably traceable to some laceration or contusion of the passage in extracting the calculus. The following case may be mentioned as a further illustration of this observation :—

CASE.—In 1866, a patient was admitted into the Northern Hospital, under my care, suffering from an incised wound of the perinæum, received in the course of what was described to me as “a free fight,” further details of which were not to be had.

The wound was just behind the scrotum, and was very similar in appearance and direction to that which a surgeon would make in opening the urethra in this position. It was a little to one side of the raphé, and was an inch and a half in length. Some hours elapsed before the patient was brought to the hospital. I found the wound plugged with lint, and blood was issuing from the penis. As the bleeding was free, I had to enlarge the wound to enable me to secure what I believe was the transverse perinæal artery. This was sufficient to arrest the hæmorrhage. I could put my finger into the urethra, which had been very neatly incised for about an inch along its floor. Urine escaped freely through the penis, and partly through the wound, for some three or four days. After this time the urine was passed naturally, and the wound closed. I saw the patient about two years afterwards, when he had no sign of stricture, or other indication, beyond the scar, of the injury he had received.

To sum up in regard to treatment generally: cases of ruptured urethra in the male may, like strictures requiring perineal section, be divided into two classes (1), where an instrument can be passed into the bladder, and (2) where it cannot. As I have already given my reasons with some proofs, I consider that the best practice, as a rule, in the first class of cases is to introduce a staff, or an instrument, and to cut down upon it freely by a median perineal incision, assuming, of course, that the injury is in the usual place, namely, the sub-public urethra. There is no occasion to introduce a drainage-

tube so long as the urine escapes and the opening is sufficiently free and dependent. For the second class of cases, the instrument should be passed as far as it will go, and the same proceeding practised as in the first class of cases. If you expose the end of your instrument by the incision, the proximal end of the urethra, if completely torn across, cannot be far off. The latter can generally be discovered by pressing above the pubes, when urine may be seen to escape, marking the position of the tear, or the proximal end of the divided canal. By this practice, in these two classes of cases we have placed the patient, both immediately and prospectively, much in the same position as after a lithotomy.

I cannot leave the subject without referring to what seems best to be done when the accident happens to a person beyond the reach of professional assistance, or where the circumstances are such as to render the operative proceedings recommended out of the question; for instance, to persons at sea, and the like, I have known this occur more than once and the cases brought to a successful issue in spite of their serious nature.

My colleague, Mr. Mitchell Banks, has recently had under his care a patient who ruptured his urethra by an injury at sea. As the surgeon of the ship could not pass a catheter, when the bladder became distended he punctured it above the pubes, and retained the cannula in this position until such time as the vessel reached port, and the patient could be admitted into the Infirmary. Mr. Banks, by a perineal incision, re-established the continuity of the urethra, and the patient made a good recovery.

This case is a good precedent when the circumstances attending any other are somewhat similar. In another instance that is known to me, this accident happened to the master of a ship, who fell over some rigging some days after leaving port for a long voyage. Recognising the nature of his injury, after various experiments had failed him, when retention of urine became extreme, he asked his mate to run a penknife into his

bladder above the pubes. This was done with complete relief; a urinary fistula followed where the incision had been made, and the captain resumed his work in less than a fortnight from his accident. At the end of his four months' voyage he was so used to the new passage for his urine that, on his return to England, after a two years' absence, he would never allow any one to undertake an attempt to efface his own conservative surgery. Though decidedly of opinion, as a rule, that cases of rupture of the urethra are safer, both immediately and remotely, with an opening in the perinæum for urine drainage until repair has taken place than they would be with catheters in their bladder passed along the wounded canal, there are instances where it may be difficult to decide that the lesion is not a mere contusion, or bruising, which may be safely left to heal with the assistance of a catheter. In a doubtful case of this kind I should advise bladder drainage to be employed by the continuous wearing of an unplugged catheter with tubing, after the plan recommended by Professor John Chiene.\* Here the urine escapes into an antiseptic fluid just as fast as it runs out of the ureters.

Where the urethra has been completely torn across by an injury, and it has been necessary to open the perinæum to allow the urine to escape, I know that it is the opinion of some surgeons that the healing process should proceed with a catheter inserted the whole length of the canal for the purpose of securing the correct apposition of the torn ends. Others have attempted to bring the divided ends together by sutures, and have, I believe, been successful in obtaining union. My own impression, from what I have seen of the management of these cases, is that with a free perineal drainage they may be left to repair just like a lithotomy, with a good prospect both of correct apposition and the formation of a scar which shows but little tendency to contract. The great risk in interfering too actively with the wounded canal either by continuous catheters,

\* *Edin. Med. Journal*, Dec. 1880.

drainage-tubes, or sutures, is that some sloughing of the circumference of the urethra adjacent to the wound may take place, and then contraction of the scar tissue is pretty sure to take place.

In the after-management of cases of ruptured urethra great attention should be paid to cleanliness, to secure which the wound should be syringed out at least twice daily with weak carbolic lotion. I know of no better application to the perinæum than tenax; it absorbs the discharge and acts as a disinfectant. After the lapse of a few days the introduction of bougies along the whole length of the urethra should be commenced, and continued at regular intervals. When the wound has healed, the patient should be instructed how to introduce an instrument for himself, the use of which he should continue, to prevent any contraction of the urethra taking place.

The following case of rupture of the urethra was attended with a state of priapism, which lasted for three weeks:—

CASE.—W. M., aged 22, was admitted into the Royal Infirmary, under Mr. Harrison's care, on October 29, 1879, with an injury to the penis and scrotum, caused by a kick four days previously. He stated that on receiving the injury he passed some blood from the urethra, and has continued to do so. On admission there was considerable ecchymosis of the penis and scrotum, and the penis was erect. From an examination of the urethra with a bougie, a partial rupture was made out four inches from the orifice. The patient was kept in bed, and evaporating lotions were applied. A most marked state of constant priapism continued for three weeks, when it gradually subsided, and the patient left the Infirmary on Dec. 1st, 1879.

## SIXTEENTH LECTURE.

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### PERINEAL FISTULÆ AND THEIR TREATMENT.

FOLLOWING upon the consideration of urinary abscess and injuries to the urethra, it will be convenient to consider certain results which these sometimes occasion. I have had, within a comparatively recent period, sufficient varieties of urinary fistula, in persons applying for treatment in my wards, to enable me to occupy your attention for one lecture in the description of some of the forms of these openings and the modifications we find necessary in their treatment.

A urinary fistula may be defined as a sinus communicating with the urethra or other part of the urinary passages through which urine escapes. Like all other sinuses communicating with natural passages, it is often exceedingly difficult to heal, and therefore every care should be taken to prevent its formation, or in moderating the inconvenience it is likely to occasion, should our worst anticipations be realized. These fistulæ are consequent upon either suppurative inflammations in the neighbourhood of the urethra or lacerations of the urethra by means of which the stream of urine is deviated from its normal course; and this includes not only accidental lacerations, but wounds that are necessary in the performance of certain surgical operations in this region. The manner in which some of these fistulæ are produced is remarkable. I saw a case in Mr. Banks' ward where a patient feeling a lump in the perinæum incised it with a razor, and gave escape to a stone as large as a cob-nut. This left a fistula for which he came under treatment. In view, then, of the causes of urinary fistulæ, there are certain rules

which experience indicates as being likely to aid in diminishing the chance of their formation, or the difficulties connected with their treatment.

The first rule is, that all suppurations about the urethra should be evacuated at the earliest possible moment. The clean direct cut made by the surgeon is more likely to heal kindly and quickly than the burrowings of a suppuration which has to make its way through structures presenting unequal powers of resistance, such as fasciæ and skin; and the second rule is, that where the urethra has necessarily to be incised, say for a stone which cannot otherwise be got rid of, the incision should be made in the way, and, if possible, at the place, in which the probabilities of its healing without trouble are the greatest; and this, speaking generally, is certainly not in the penile portion of the urethra.\*

Urinary fistulæ are met with in all parts of the urinary tract from the kidneys downwards. Such sinuses, when connected with the kidneys, are usually the result of acute calculous pyelitis. In one instance of this nature, which came under my observation, the patient had had for two years a sinus in the lumbar region, through which urine in small quantities and pieces of calculi occasionally passed.

Fistulous openings into the bladder are far more frequent; these for the most part are of a malignant nature, and, when communicating with the lower bowel, are remediable only by

\* Bearing upon this point, and no doubt dictated with the view of preventing the formation of a fistula, I find the following remark in an old writer, which I think worth repeating:—"If a small stone be lodged in the urethra near the glans, it may often be pushed out with the fingers or picked away with some instrument; but if it stops in any other part of the channel it may be cut upon without any inconvenience; the best way of doing it is to pull the prepuce over the glans, as far as you can, and then, making an incision the length of the stone through the teguments, it may be turned out with a little hook or the point of a probe; the wound of the skin slipping back afterwards to its proper situation, and from the orifice of the urethra, prevents the issue of the urine, and very often heals in twenty-four hours."—*The Operations of Surgery*, Samuel Sharp, F.R.S. Seventh Edition. 1758.

colotomy. In the case of a female patient, from whom Mr. Bickersteth removed a large stone by the supra-pubic operation, there was a sinus opening in the buttocks and communicating with the bladder, through which urine was discharged in considerable quantities. Such a complication as this, is however, exceedingly rare in connection with stone in the bladder. Then we have fistulous communications with the bladder resulting from injury done to the parts during the process of parturition. I merely allude to these; it is to those fistulous openings in the male which show themselves on the perinæum, scrotum, and penis that I purpose referring in detail.

Let me take an example of the simplest kind. A patient with a stricture has some localized inflammation taking place behind the obstruction; this suppurates, and the matter is discharged either spontaneously or by an incision, we will say, through the perinæum. The discharge of matter is followed by that of urine, which continues to flow through the artificial opening, in greater or lesser quantities, at every act of micturition. So long as the stricture remains untreated, and urine meets with an obstacle to its escape through the natural channel, so long does the inconvenience continue. No plan of treatment specially directed towards the closing of the fistula can possibly be successful until the stricture in front of it is completely dilated. This is the first principle in the treatment of this complication, and to effect the dilatation of the stricture the same rules are applicable as those I have referred to in speaking of the circumstances which indicate the selection of the one proceeding or the other. In a certain proportion of cases of urinary fistula, all that it is necessary to do is to treat the stricture, to remove all impediment to the escape of urine *per viam naturalem*, and the sinus closes.

I remember a case being admitted into the Infirmary, which shows the importance of dilating the stricture before doing anything else, where an endeavour had been made to close a fistula

by the injection of an irritant into it without any regard being paid to the stricture. The patient had been in the habit of passing his urine almost entirely by the sinus. The injection of this irritant led to inflammatory swelling, which blocked up the fistula, and, as might have been expected, brought on complete retention of urine. This was speedily followed by swelling of the perinæum, scrotum, and lower part of the abdomen. Several hours elapsed before his admission, by which time the scrotum had become almost gangrenous from extravasation. The patient being etherized, I laid open the perinæum, and on a small staff divided a hard stricture, making other incisions in the scrotum and adjacent parts, wherever the presence of extravasated urine rendered it necessary. The patient remained in a very critical state for several days, the tongue being dry and the pulse small and frequent, requiring a liberal allowance of stimulants, milk, and beef-tea. Though almost the whole of the scrotum sloughed away, the patient eventually made a good recovery.

If dilatation of the stricture is not sufficient to bring about closure of the fistula, I recommend an expedient I first saw practised by Dr. Gouley in New York, and which I have on more than one occasion successfully advised—that is, I direct the patient on every occasion he micturates to close up the orifice of the fistula with his finger, and to be careful by the exercise of a sufficient amount of pressure to prevent the escape of a single drop of urine by the false route. Patients have been cured of vesico-intestinal fistulæ by lying on their faces when passing water; in the same way some recent vesico-vaginal fistulæ have been successfully treated. I have seldom found advantage from the retention of a catheter in the bladder with the object of curing a fistula, as the urine almost invariably makes its way into it by the side of the instrument, but I have seen a fistula completely cured by the patient passing for himself a catheter on every occasion of micturating. When an attempt is made to cure a recent fistula with the catheter, it

should be employed, as Professor Chiene suggested, as a continuous drain.\*

When a fistula has been in existence for some time its walls become thickened, and it is not found amenable to the simple expedients I have referred to. Under these circumstances, I believe that Brodie's plan is about the best to employ. This consists in stimulating the bottom of the sinus by the occasional introduction of a small piece of nitrate of silver, at the same time retarding the healing of the *orifice* of the sinus (which is more inclined to heal than the bottom of it towards the urethra) by lightly touching it occasionally with potassa fusa. For the same purpose the actual cautery, applied by means of a wire, has been recommended.

In a certain proportion of cases, even where the stricture has been most completely dilated, the fistula fails to heal in spite of the employment of the means I have mentioned. The selection of further expedients will greatly depend upon whether the fistula is attended with a loss of substance or not. And, first, I will refer to those cases in which, though the fistula fails to heal, there is no appreciable loss of substance.

The most important and noteworthy means for effecting closure of a fistula undoubtedly consists in diverting the stream of urine and preventing it under all circumstances entering the false route. The simplest expedient for diverting the stream of urine is that which has been frequently resorted to in the cure of penile fistulæ; we know how difficult these are to close compared with those openings which are made in the urethra for a variety of purposes from the perinæum, which generally speedily heal.

Some years ago, a boy was admitted into the Infirmary, under my care, with a fistula just at the angle where the penis and scrotum joined; it had followed the retention of a metallic catheter in the bladder, which was considered necessary for a rupture of the urethra. Various expedients were tried to close the fistula, but without avail.

\* *Edin. Med. Journal*, Dec., 1880.

There being little or no contraction of the urethra, I introduced a grooved staff and performed the median operation, as if for stone. I then pared the edges of the penile fistula and closed it with wire sutures. The effect of introducing my finger into the bladder through the perinæal incision was so to over-dilate the prostatic urethra as to cause the urine, for some days, to be passed incontinently by the wound. During the interval the penile fistula completely healed, and within a fortnight from the operation the perinæal opening also closed, and the patient left the Infirmary with his urethra sound and able to micturate normally.

An extension of this method of treating urinary fistulæ has been adopted with complete success by my colleague, Mr. Banks. I shall refer to the case not only as illustrating the principle I am at present discussing, but as furnishing us with a practice which is likely to be exceedingly useful in remedying one of the most distressing conditions connected with the urinary organs.

Mr. Banks's case was one of urethral fistula, with an opening in the rectum and another in the perinæum, the intervening tissue being unhealthy and undermined. The treatment adopted was to lay these openings into one, the doing of which disclosed a large aperture in the urethra, through which the urine escaped. All kinds of treatment proving futile, Mr. Banks resorted to the following expedient:—Passing a trocar and cannula into the bladder through the perinæal chasm, he tapped the bladder into the rectum, thus reversing the usual order of proceeding. Then through the cannula he passed an india-rubber winged catheter, leaving the winged end on the floor of the bladder and the other hanging out through the anus; the edges of the deep perinæal cleft were then pared and accurately approximated. After the operation the patient passed his urine through the anus by means of the india-rubber catheter. Within four months of the operation the patient was able to leave the Infirmary and resume his occupation, with his urethra, as it is expressively stated, as “tight as a drum.” He remains quite well.

I am indebted to Mr. Banks for his permission to reproduce the woodcut (Fig. 29) illustrating his original paper.\*

The practice of treating these fistulæ by diverting the stream of urine is further illustrated by the employment of perinaal section, which has for its object the division of the stricture and the providing of a single outlet for the urine.

Of the advantages of the proceeding you have seen several instances, illustrating also the performance of the operation

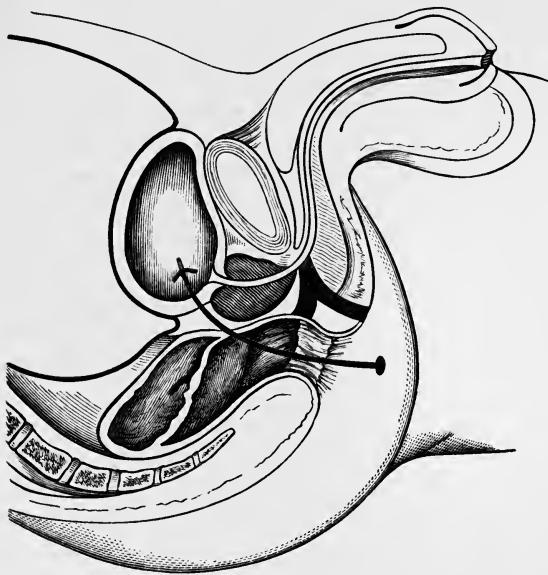


Fig. 29.

under its two different aspects—namely, where an instrument can be passed into the bladder, and where it cannot. The performance of the operation under each of these circumstances has already been fully discussed in my lecture on external urethrotomy. Let me, however, make the remark, that the number of such cases where it was supposed no kind of instrument could be passed into the bladder has been very sensibly diminished by the employment of “whips” and Gouley’s

\* *Edinburgh Medical Journal*, June, 1878.

filiform bougies and tunneled instruments. Their successful use in all cases of this kind, excepting where the distal urethral opening has become obliterated by reason of all the urine escaping through the fistula, is almost certain.

And now I will take one or two illustrations from my wards of the application of external urethrotomy to perinæal fistula. And first, where an instrument could be passed through the stricture into the bladder.

J. B., aged 41, was admitted into the Infirmary, under my care, on August 1st, 1878. His history was that of a stricture following gonorrhœa, a perinæal abscess, or rather abscesses, and urinary fistulæ, through which the greater proportion of his urine had for some months been passing. On his admission, I found a tight stricture in the sub-pubic urethra, through which a No. 3 English bougie could just be passed; there were three fistulæ, one perinæal and two scrotal. The patient was very intolerant of the passage of a bougie, and I determined to perform external urethrotomy as soon as I could get my No. 6 grooved staff fairly into his bladder. This took me three weeks to do, when I was enabled to accomplish my object, and completely divide a long stricture from the perinæal wound. This permitted me to pass a full-sized instrument throughout his urethra, so satisfying myself that I had removed all resistance. As I had the three fistulæ now to deal with, with the view of completely draining them, I passed a gum-elastic catheter from the perinæal wound into the bladder, through which all the urine escaped. This I retained for forty-eight hours, by which time I had diverted the whole of the urine from the fistulous tracts, and through the perinæal opening. Not to weary you with details of treatment, in five days after the operation I commenced to pass bougies of a full size, which I continued to do until the perinæal wound had completely closed. In six weeks, and without any special attention, the fistulæ and the perinæal wound had thoroughly healed, and the patient left the hospital with instructions to pass for himself a full-sized bougie, which he had speedily learned to do.

As an instance of the successful treatment of a stricture which I, as well as others, found to be impassable, I believe from obliteration of the distal aperture, and complicated with no

less than nine fistulæ, I cannot do better than record the case of:—

Thomas D., a sailor, aged 39, was admitted into the Royal Infirmary, under my care, on May 30th, 1879. His history was that of a gonorrhœa nine years ago, subsequent stricture and urinary abscesses, in addition to two injuries to the perinæum resulting from falls. On admission into the Infirmary, the scrotum and perinæum were swollen and brawny, and riddled with no less than nine fistulæ, running in various directions, including one which distressed him more than the others, as it opened on the surface of the abdomen amongst the pubic hairs. The state of the parts well represented, during micturition, the rose of the typical watering-pot. On examining him on several occasions, I could never succeed in passing the finest instrument into the bladder. I question whether the urethra was at all permeable, for, in addition to the above-mentioned circumstance, I was unable to ascertain that any urine escaped during micturition otherwise than by the fistulous tracts. In considering what to do for the patient, I felt that his state was so deplorable that almost any risks were justifiable which offered a reasonable prospect of improvement. There was no evidence that his kidneys were seriously unsound, and, even had they been so, I should have been disposed to believe that the sense of relief an operation might afford would more than compensate for any shock occasioned by it—just as we see the most miserable hectic patients spring, as it were, into a new life when the irritation of a diseased joint is removed. I therefore determined to perform perinæal section, and to give the patient one direct channel by which he could discharge his urine. The only difficulty, so far as the operation was concerned, was that I had to do it without the guide of an instrument passed into the bladder, and upon a urethra necessarily contracted behind the stricture, by reason of the fistulous openings. However, all this was safely accomplished by keeping my incision in the median line and with the apex of the prostate as an unerring guide. The result was all that I could have wished; the relief afforded by the one opening was most marked, and the patient made very satisfactory progress. At the time of the operation I believe I also opened up the occluded distal orifice of the urethra. Presently I got in a fine gum-elastic instrument, and by means of continuous dilatation the calibre of the strictured urethra was brought up to a No. 9, English scale. All the fistulæ closed.

Much of the hardening disappeared, and the patient left the Infirmary able to micturate naturally—a striking contrast to his state on admission. Such, then, is an illustration of the results we may obtain in impassable strictures, complicated with numerous fistulæ, by external urethrotomy. I am indebted to my dresser, Mr. R. P. Sykes, for the notes of this case.

As somewhat differing from the case just recorded, but bearing upon it, I would cite the particulars of the following, in which there was occlusion of the urethra consequent on a wound:—

This patient, a boy aged 11, I saw with Dr. W. Little, formerly of Everton. He had been crushed by a carriage, and had evidently sustained some severe injury to the pelvis, as well as to the urethra. He had complete retention, and we were unable to pass the catheter further than the deep fascia, where the urethra appeared to be wholly severed. Under these circumstances we agreed that a free perinæal incision was required, and this I accordingly made. A considerable quantity of urine and extravasated blood escaped. A fracture of the pubic arch was also discovered. For several weeks the patient remained in a very precarious state, as the injury was followed by an acute attack of peritonitis, and for weeks all urine escaped by the wound. As soon as the patient's health permitted, I attempted to establish the continuity of the urethra; the canal having been completely severed, the distal end had closed. This was a very troublesome affair, but eventually it was accomplished, and the perinæal wound healed. I had the patient under observation for nearly eighteen months, and when I last examined him, though the urethra admitted a full-sized bougie, yet at the site of the injury the tissues were rough and cicatricial, so that I fear there may be some permanent contraction.

I have to notice those forms of perinæal fistula attended with more or less destruction of the tissues adjacent to the urethra, the simple closing in of which would obstruct the urethra. To remedy these a plastic operation is necessary, in addition to the application of those principles to which I have referred, and which are equally essential to successful treat-

ment. I might occupy your time at considerable length by a description of the various modes of transplanting tissue for this purpose which have been adopted; the most important of these you will find detailed in the text-books on surgery.

*Malignant Fistulæ.*—Instances will occasionally be met with where urinary fistulæ become epitheliomatous. Mr. Paul \* has recorded a typical example of this class of cases, which is fortunately rare. I have, however, met with several instances; the openings usually present a worm-eaten appearance, they are indurated and warty, and no kind of treatment, so far as I have tried, does them any permanent good. I have scraped them, cauterized them, and used various applications independent of the treatment the stricture required, but I cannot say that any advantage followed these various attempts; they have gone on from bad to worse, and the end has merely proved a matter of time. Mr. Banks † has very graphically described what I take to be their counterpart in the anal region, which he speaks of as “not malignant in the sense of being cancerous, but they deserve the title from the fact of their being incurable by the means which cure ordinary fistulæ.” He then proceeds with illustrations which must strongly remind us of what we have seen in connection with the urethra.

Prevention is better than cure. Many cases of the kind I am now referring to are instances where ordinary sores have, as it were, been worried into cancerous ones by the presence of a long-abiding source of irritation in a suitable soil. We see it almost everywhere: in the skin, the lip, the scrotum, the penis, and the uterus will be found the most striking examples of this kind of sore degeneration. Many a cancerous, and epitheliomatous, or non-healing sore, might have been averted by the recognition of that sound surgical principle which demands the early removal or cure of anything that promises to be a continuous irritant to the part in which it occurs. Who can tell

\* *The Lancet*, June 20th, 1885.

† “The Surgery of the Rectum,” *Liverpool Med. Chir. Journal*, July, 1886.

whether a given individual is likely or not to take on cancerous ways if he is only sufficiently and persistently provoked. Most urinary fistulæ are readily healed by attention to those principles which I have endeavoured to lay stress upon, and this should be our object to bring about without delay.

In connection with this point, the question will again arise: Is it desirable to attempt the cure of certain urinary fistulæ? In some instances the natural passage has been so damaged by disease as to be useless, and the artificial one is either the effort of nature or the work of the surgeon. If the anterior part of the urethra has become obliterated to some considerable extent, and the artificial channel is direct and answers all the purpose of the male urethra so far as passing urine is concerned, the fistula ceases to be regarded as an irritant, and, as a rule, should not be interfered with. On the other hand, when the degree of obliteration of the distal part of the urethra, immediately in front of the fistulous opening which has been doing duty for a urine passage, is only slight, and surrounding circumstances are generally favourable, it might be justifiable to attempt the reproduction of that part of the canal which has been lost. How this may best be done will be seen on referring to a previous lecture (twelfth). It is the only way which I have found at all reliable in these cases.

There is a form of urethral fistula which I think was first described by Reliquet\* under the name of non-urinary fistula. They are to be met with about the orifice of the male urethra. Some years ago I was seeing a patient pretty constantly who we supposed was suffering from an extremely obstinate though slight attack of gonorrhœa. Everything was tried, including bougies, pessaries, and innumerable injections, but all without avail; the only person who seemed to have any doubt about the diagnosis was the patient himself, who was at his wit's-end to explain how he had ever contracted such a disease. One day, when examining him very carefully, I noticed that the little

\* "Fistules urétrales non urinaires," *Gazette des hôpitaux*, 1885.

discharge about the meatus which was the source of all our trouble did not come from the canal at all, but from an extremely minute opening by the side of the meatus. Into this a bristle was passed for two or three inches, I momentarily expecting that it would enter the larger passage, but this it did not do, proving itself to have quite an independent existence. On the next day we passed a fine probe, used for the puncta of the eye, and this likewise descended to a considerable depth. The mystery was solved, my patient's character was cleared, and in the course of time, by introducing the fine probe occasionally, the sinus closed without any trouble. In fact, the only trouble at any time was the sort of deception the disease practised upon us, and the belief that the patient was suffering from gonorrhœa. I have seen this at least half a dozen times since, and connect it with a suppuration either of a mucous follicle, or, as I believe Reliquet suggests, of a Cowper's gland. I have been surprised at the great depth these sinuses travel; but I have never been able, even with the finest cat-gut bougie, to trace any connection with the urethra, though they run parallel with it. I have thought of enlarging the openings of these fistulæ with a fine pointed knife, but the progress of the cases has so far proved this to be unnecessary. They are more alarming in the suspicion they create, otherwise I do not suppose they would be deemed worthy of much attention. I should add that Reliquet has succeeded in demonstrating that these fistulæ may communicate deeply with the urethra by means of injecting them with water.

In connection with the treatment of urethral stricture, I have on some occasions noticed that when from any cause, such as gout, indulgence in alcohol or venery, or even from the use of instruments, a chronic purulent discharge has been set up, the patients will suffer somewhat in the same way as in the condition to which the term gonorrhœal rheumatism has been applied. I have learnt to regard these states as analogous, and to treat them accordingly. I usually suspend local instru-

mental treatment, and have the urethra washed out two or three times a day with a weak solution of corrosive sublimate, one-eighth of a grain in eight ounces of water is quite strong enough for this purpose. In addition, the salicylate of soda, in moderate doses, will be found serviceable.

## SEVENTEENTH LECTURE.

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### FOREIGN BODIES IN THE URETHRA AND BLADDER—ACTION OF URETHRA—ILLUSTRATIVE CASES—USE OF THE LITHOTRITE AS AN EXTRACTOR—FOREIGN BODIES IN THE FEMALE BLADDER.

THROUGH accident or by design foreign bodies occasionally become lodged within the urethra or the bladder. Amongst the miscellaneous articles that have been found in one or other of these positions I can recall to mind pins, needles, wires, a lucifer match, a knitting needle, a slate pencil, a feather, a bulb-headed grass, pieces of catheters and bougies, a whole bougie, and a pencil-case; but, taking the experience of others, this repertoire might, I expect, be considerably extended. Most of these articles have been introduced for the purpose of acting upon the penile portion of the urethra—for reasons often best known to the patients themselves,—and, having slipped from their grasp, have made their way into the bladder. In reference to some discussion\* which took place relative to the movements of foreign bodies along the urethra, my impression is that the vermicular action of the urethra is an ejaculatory one, and that a foreign body is only forced towards the bladder when, in itself, it presents some obstacle to its passage outwards. If this were not so, renal calculi would experience much more difficulty in making their escape along the canal than they evidently do. A piece of bougie placed within the urethra, with its anterior extremity broken and

\* *The Lancet*, vol. ii, 1866.

uneven, and its posterior end smooth, is sure by vermicular action to be forced in a direction *towards* the bladder by the very efforts that are made by the urethra to expel it. Just as when the movements of the intestines are interfered with by a portion of the gut becoming strangulated, the contents of the canal are, by vermicular action, thrown backwards, instead of being propelled in a direction onwards to the natural outlet.

I will proceed to narrate some cases where foreign bodies have been passed into the urethra, as serving to illustrate certain points in practice which they suggest.

In 1861, Mr. Stubbs saw a youth, aged 16, who was suffering from some induration in the ischio-rectal fossa and perinæum. On inquiring into his history, he found that eighteen months previously the patient had passed into his urethra a good-sized needle, which, having slipped from his grasp, disappeared. Not liking to mention it to any one, he had refrained from seeking surgical advice. He appears to have suffered very little inconvenience from his accident up



Fig. 30.

to within a week of his being seen, when he had some pain about the perinæum and difficulty in micturition. As fluctuation could be felt in the ischio-rectal fossa, an incision was made, and some matter evacuated, but no needle could be felt. Mr. Stubbs introduced his finger into the rectum, where he could distinctly feel the sharp point above. He then incised the perinæum in the median line, and removed the needle represented in Fig. 30. The patient recovered rapidly, and the opening entirely closed, no urine escaping through it. The needle, apparently, was more than half covered with a deposit of lithic acid.

The needle appears to have been introduced blunt end foremost, and so to have made its way into the bladder, where, in the course of time, it was largely coated with calculous deposit. Escaping from the bladder, it became lodged in the perinæum, and was extracted in the manner described. It is interesting

to observe the calculous incrustation that took place on it, as explanatory of the formation of stone,\* this being one of the ways in which a calculus is formed. We have had numerous instances of this. In one case where I performed lithotomy, the nucleus proved to be a piece of bone. Mr. Wilkes,† of the Salisbury Infirmary, records a case of the same nature, which presents special points of interest.

In 1865, Mr. Stubbs removed, at the Royal Infirmary, a urinary calculus from the bladder, the nucleus of which was a piece of bougie about one inch in length; in this case, curiously enough, there were no symptoms whatever of stone in the bladder. The patient was suffering from stricture of the urethra, for the relief of which perinæal section was decided upon. Mr. Stubbs performed the operation in the usual way, and on an instrument being passed into the bladder a stone was felt, and without much difficulty removed through the perinæal wound. The patient had been in the habit of introducing a bougie, and remembered, three months previously, a piece breaking off; but as no untoward symptom resulted, he thought nothing further of it.

Fig. 31 represents a phosphatic calculus, from the Museum of the School of Medicine, the nucleus of which is a piece of metal.

Amongst the more remarkable objects that have found their way into the bladder is a bulbous grass.

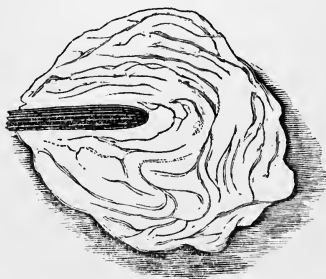


Fig. 31.

This case came into the Royal Infirmary in 1865, under the care

\* In the Museum of the Royal College of Surgeons is a calculus (A 126) from the human bladder, having a slender piece of steel for a nucleus. In reference to the specimen the catalogue contains the following note :—"The deposit of uric acid, or any other substance except the earthy phosphates, upon foreign bodies in the bladder, is exceedingly rare."

† *Proceedings Royal Med. Chir. Society*, Part 45.

of Mr. Long. The patient supposed that he was suffering from stricture, to remedy which he was in the habit of passing different materials into his urethra. On this occasion he selected the ear and stalk of one of the grasses, which was introduced readily enough, but could not be withdrawn. Further efforts on his part only made matters worse, the ear being forced from the urethra into the bladder. When admitted into the Infirmary, shortly after the accident, he was

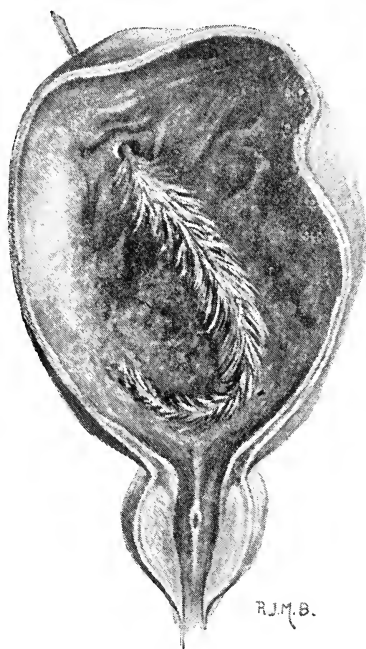


Fig. 32.

suffering from most acute cystitis. A lithotrite removed a portion of the grass-head, "slightly encrusted with phosphates. The symptoms, however, were not abated, and death resulted. On opening the abdomen there was found general peritonitis, the viscera being either adherent or coated with a layer of lymph. Within the abdominal cavity were four or five pints of turbid serum, which exhaled an ammoniacal odour. Upon examining the bladder, (Fig. 32) a large head of one of the grasses, covered with phosphatic deposit, was found

impacted within it.\* The stalk, which was stiff and resisting, had made its way through the fundus of the bladder, and protruded into the peritoneal cavity. The pelvic cellular tissue was infiltrated with purulent matter, having a urinous odour. The inflammation extended up the ureters to the kidneys.

The history of the case was not obtained without considerable difficulty, and what had actually been inserted into the urethra was almost a matter for speculation, which the introduction of the lithotrite only incompletely determined.

A somewhat similar case is recorded, in which Mr. Heath, of Manchester, removed by lithotomy about three inches of the stem of a sage-plant, with a thick coating of triple phosphate at the distal end. †

The next specimen I will show you is a needle, armed with



Fig. 33.

a knob of sealing-wax, which was passed into the urethra, for some imaginary complaint, by a young gentleman, and ultimately made its way into the bladder. After remaining there for some twenty-four hours, it appears to have been forced out into the perinæum, whence it was removed through an incision, by Mr. Swinden, who kindly presented me with it. The sketch (Fig. 33) represents its actual size, from which it will be seen that it measures nearly three and a half inches in length.

In 1864, a case was related at the Medical Society by Mr. Hamilton, in which, at the Southern Hospital, he had removed from a man's bladder portions of calculus concretion formed on a feather, which had been passed by the patient for the relief of

\* What I have described as a "grass-head," Dr. W. Carter, the Professor of Materia Medica at the College, kindly informs me is the spikelet of the meadow fox-tail grass (*Alopecurus pratensis*).

† *Manchester Medical and Surgical Reports*, vol. ii.

a stricture. Here lithotomy was performed, as, from the nature of the stricture, lithotrixy was impossible.

I will now pass on to notice a case in which I removed a foreign body from the bladder by means of the lithotrite, and which testifies to the value of this instrument under such circumstances. I am indebted to Dr. I. Holmes, for the notes.

W. O., aged 38, a militiaman, was admitted into the Royal Infirmary on May 22nd, 1877. His statement was to the effect that, on the previous night, when under the influence of liquor, a pencil-case had been introduced up his urethra by a prostitute, in whose company, together with others, he had been. He did not appear, however, to have discovered anything amiss until the following morning, when certain uncomfortable sensations in the region of his bladder made him come to the conclusion that the lost pencil must be there. From his manner I was first inclined to think that the man was insane, but on hearing that the surgeon of his regiment had discovered the existence of a foreign body in his bladder, and had sent



Fig. 34.

him to the Infirmary, I at once proceeded to examine him. Upon examination, the foreign body appeared to be lying obliquely, partly in the bladder and partly within the prostatic portion of the urethra. I first attempted to remove it by means of the extractor, which is described in Reliquet's *Traité des Opérations des Voies Urinaires*, and known as the instrument of Messrs. Robert and Collin; but failing, a lithotrite was passed. By this the pencil was carried on completely within the bladder, where it was seized transversely. In this position it was impossible to extract it; however, by gradually rotating the lithotrite towards one side, whilst the pencil was within the blades of the instrument, I succeeded in reaching one end, when the pencil was removed, point foremost, without any further difficulty or damage to the urethra. The exact size of the pencil-case is represented in Fig. 34. The patient was placed in bed, and a linseed poultice applied over the abdomen. During the afternoon and night he passed urine naturally, and on the following day appeared in no respect the worse for what had been done. He was kept in the Infirmary until May 24th, when he went out on leave, but did not return.

Referring to the manipulation employed in extracting the pencil, I should say that similar means had been successful in another case which had come under my notice only a short time previously, in which I had succeeded in removing from the bladder a piece of gum-elastic bougie that had been accidentally broken in the urethra. In the instance I have just recorded the extractor failed, because at first the pencil was firmly impacted, and therefore could not be made to rotate. Had I not succeeded with the lithotrite, I should have had recourse again to the extractor, which would then probably have been successful, inasmuch as, the pencil being fairly within the bladder, rotation would have been practicable. The difficulty in removing foreign bodies from the bladder, such as pieces of bougie, is due to their being generally seized by forceps or the lithotrite transversely. This difficulty Messrs. Robert and Collin have endeavoured to overcome by the use of an instrument something like a lithotrite (Fig. 35), the blades of which are so arranged that on seizing a body, such as a piece of bougie, it is rotated, and in its long axis made to correspond with the course of the urethra. The bladder should be partly distended with water before the extractor is introduced.

It seems difficult to imagine that persons can become so demoralized as actually to resort to such a method of vindictiveness as is evidenced in the case I have just recorded.

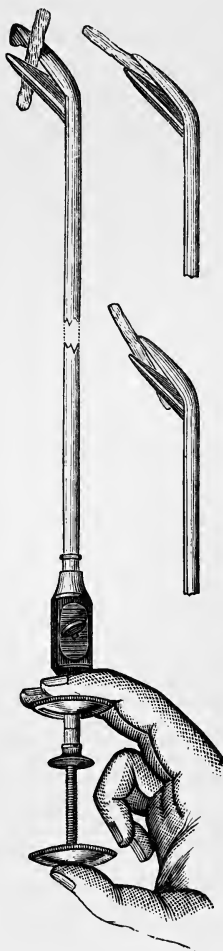


Fig. 35.

Recently a somewhat similar case is published,\* where a piece of stick covered with prickles (Fig. 36) was introduced up the urethra of a male in such a way as to render it impossible to draw it out, without subjecting the canal to the most extreme laceration. I quote the following passage from the record by Dr. G. A. Harris :—It transpired on enquiry that three brothers, not quite approving of the attention paid by my patient to one of their female relatives, took counsel together, and waylaying him in the jungle at night, overpowered him, and deliberately introduced two and a half inches of thorny cane into his urethra, well knowing from the disposition of the thorns on the stem that it would be extremely difficult, if not impossible, for the victim himself to remove it, and that, in any case, extreme suffering would result; a powerful moral hint being at the same time inculcated in a way that would ensure its being remembered through life. I gently pushed the stick back until I judged all the thorns had become disentangled, and, with some little trouble,



Fig. 36.

succeeded in passing a cannula over it, as recommended by Mr. Christopher Heath, and withdrew the piece of stick easily through the cannula."

In the majority of instances the history and circumstances connected with the introduction of foreign bodies into the bladder are extremely vague, and the practitioner has often but little to guide him in the treatment of the acute symptoms of cystitis and subsequently of peritonitis which supervene. In the example recorded and figured (Fig. 32), where a grass-head was passed into the bladder and caused death by perforation and peritonitis, nothing would have saved the patient, even had it been possible to make a full diagnosis in the absence of a correct history, at the time he was admitted into the Infirmary, but a supra-pubic cystotomy with closure of the perforation into the abdomen by sutures, as is now done in the case of a ruptured bladder. The study of cases and pathological records

\* *British Medical Journal*, Feb. 19, 1887.

where foreign bodies have been introduced into the bladder, both in males and females, indicates that in many not only was their removal by operation imperative, but that the method selected should have been of such a nature as to permit the inspection and exploration of the whole of the interior of the viscus, with the view of ascertaining whether such damage was occasioned by the pressure of the foreign body as to render a perforation imminent. If this were the case in a given instance, a laparotomy must necessarily supervene upon a cystotomy. The higher operation would alone permit of our applying such an examination and treatment to the bladder if perforated or on the verge of it, as we should to the intestine if similarly involved. Instances will be found recorded where, though foreign bodies were removed by perinæal cystotomy, the patients eventually died of perforation and peritonitis. Such a contingency as this, it should be our endeavour to avoid.

In another case I removed from the bladder of a middle-aged man a No. 3 bougie, twelve inches in length.

The bougie had been introduced by a surgeon as a conductrice to a urethrotome, with which it was intended to divide a stricture by internal section. Unfortunately the bougie separated from the urethrotome just beyond the point where it was attached by means of a screw. The surgeon at once ruptured the stricture by Holt's method, and left the bougie in the bladder for extraction on a future occasion. I saw the case fourteen days after the accident. As the urethra would by this time admit a No. 12 bougie, I had no difficulty in introducing the lithotrite and extracting the bougie. This I seized about the centre and brought out doubled; it being soft and of small size, the removal was accomplished by merely gentle traction. The patient recovered without a bad symptom. The bougie appears to have remained curled up in the bladder; no calculous deposit was observed upon it, although it had been retained for a fortnight.

This case points to the necessity of care being exercised in properly securing the connecting links between the urethrotome and the guide. Additional means of security have, I understand, been taken in the construction of the kind of instrument

used on this occasion, to obviate the occurrence of such an accident as I have described, which might have given rise to much more serious consequences. Mr. Lund records a very similar case, where he removed a bougie from the bladder by the lithotrite. In this instance, also, it was complicated with stricture, for which Holt's operation was performed previously.\* An extremely interesting case, where a piece of bougie remained in the bladder for five years, and was successfully removed, encrusted with phosphates, by lithotomy, is recorded by Mr. J. W. Baker.†

Perhaps more remarkable than the case of the pencil-case, just recorded, is one where I removed the whalebone mouth-piece of a tobacco-pipe (Fig. 37) encrusted with phosphates, by



Fig. 37.

cystotomy. As to how the foreign body got into the bladder the patient must speak for himself:—

R. H., aged 33, a seaman, was admitted into the Royal Infirmary on June 23rd, 1884, suffering from symptoms of vesical irritation. The history elicited the following points:—Eight years previously he had suffered from gonorrhœa. In December last he had some scalding after micturition, and in the same month he was admitted into a hospital in Wales with a fractured leg. Whilst there he appears to have suffered from vesical irritation, and passed two pieces of stone; his symptoms continued on his return home. On admission into the Infirmary I found him suffering from stone in the bladder. Upon examining the calculus with the lithotrite it proved to be large, soft, and peculiarly shaped. The last-mentioned circumstance determined me to cut instead of crushing. On June 27th I performed lateral lithotomy, and removed a large phosphatic calculus, which broke under the grasp of the forceps and disclosed the whalebone mouth-piece of a tobacco-pipe, to which a small piece of rotten string was

\* *Liverpool and Manchester Medical and Surgical Reports*, 1873.

† *British Medical Journal*, Dec. 5, 1874.

attached. It was noticed that the smell of tobacco in the mouth-piece was quite distinct. As the phosphatic envelope crumbled under the pressure of extraction, it was impossible to estimate correctly its weight. It must have been very large. About an ounce of these fragments was collected and weighed. The exact size is shown in the drawing. The patient made a good recovery, and left the Infirmary on July 28th. On the fourth day after the operation I shewed him the foreign body, and asked whether he could offer any explanation as to how it got into his bladder. He remarked, that "he was glad to see it again. He had swallowed it whilst larking with some companions on board ship three years ago. He felt no pain at the time, nor until last December, when the symptoms of something wrong with his bladder shewed themselves." He was frequently spoken to in reference to the improbability of such an explanation, but he would never admit of any other construction being placed on the word "swallowed" than that usually adopted.

In this latter statement of the patient will be found the first point of interest. Though so highly improbable was it possible? In this respect it is analogous with Sir Alfred Roberts' case referred to further on. An instance such as this also shews the difficult position a surgeon may find himself in at the commencement of what he concludes is a suitable case for a crushing operation. Here I had no history except the ordinary one of a stone case to guide me; the stone was soft, and, though large, was not in my judgment from other experiences, beyond the reach of litholapaxy. In handling the calculous mass as it lay in the bladder with my lithotrite, as I invariably do before proceeding to break, I was at once made aware that I had an unusually shaped body to deal with, quite unlike any stone I had ever felt before in this way. This aroused my suspicion, in spite of a most positive assurance on the part of the patient to the contrary, that I had a foreign body to deal with of a considerable size as the nucleus of the phosphatic mass. This determined me to cut without hesitation. If I had pursued my original idea I should probably have discovered my error in time to rectify it; but if I had not, and had persevered in my

attempt to crush, I might have done irreparable damage to the bladder, and spoiled the chances of my patient's recovery. The case is an important one as indicating a source of fallacy and of danger in every case of crushing we undertake. If patients will not tell us, or do not of themselves know that they have pencil-cases and pipe-stems in their bladders, we cannot always be expected to enlighten them at once upon this point.

The publication of the case I have just narrated\* led to my receiving several very interesting letters from practitioners throughout the country bearing upon the point I have just raised. Amongst these was one from Mr. J. H. Wilson, of Thetford, who refers to a case successfully operated on by Mr. Cadge by lithotrity, where the nucleus of the phosphatic mass in the bladder turned out to be a boot-lace. Having anticipated that he had to deal with a foreign body, Mr. Cadge writes:—"My suspicions turned out to be correct, for I have removed, at four or five sittings, with the lithotrite, six or seven inches of a black thin thing which I believe to be a common boot-lace, covered with phosphates. Even with this evidence, the fellow will not confess to having introduced it, or allowed any one else to do so." Mr. Wilson adds: "Like your patient, mine remembered, after a stretch of memory, having swallowed a boot-lace." These cases are of value, as I said before, as illustrating difficulties in diagnosis which, without such examples, we might hardly expect to meet.

In connection with the point just raised as to the passage of foreign bodies from the intestines to the bladder, it will be desirable to refer to those where there can be but little doubt that such a course was taken. We may put aside as hardly bearing upon the subject those instances of malignant ulceration where the bladder and intestines have been thrown into one chasm, and where a free interchange of their respective contents, gaseous, fluid, and solid, takes place. These unfortunate examples will again come under notice in connection with

\* *The Lancet*, Feb. 14th, 1885.

the subject of malignant ulceration of the bladder and its treatment.

I am now speaking of examples where the foreign bodies have made their way into the bladder apparently from some part of the intestinal tract. Sir Alfred Roberts, of the Sydney Hospital, N.S.W., records one where the patient, forty-seven years of age, had swallowed a piece of slate-pencil two and a quarter inches long, which was subsequently successfully removed from the bladder by lithotomy. Commenting upon this, the author says :—"I have left no stone unturned to elucidate the truth in this interesting case, and I can only state that, after much hesitation, I have arrived at the conclusion that the pencil was swallowed by mouth, and made its way by inflammation and ulceration into the bladder." \*

Dr. Rawdon met with two instances in his practice as surgeon to the Children's Infirmary, where a needle and a sharp piece of wood formed the nuclei for stone removed by lithotomy. In both cases he believed that the foreign bodies had made their way into the bladder from the intestines.

A case is recorded by Mr. Brownhill where a woman, aged twenty-six years, passed spontaneously by the urethra a stone weighing over half an ounce, the nucleus of which was a hair-pin. Twenty-seven months previously, when straightening her hair with the pin in her mouth, one of her companions pulled her hair behind, causing her to laugh and throw her head back, when the pin slipped down the œsophagus. It was considered probable that the pin passed from the sigmoid flexure of the colon into the left side of the bladder. †

Amongst the more remarkable instances where foreign bodies have been introduced into the bladder and perforated it, is one recorded conjointly by Dr. Benham and Mr. Greig Smith, ‡ where the bladder was found perforated so as to permit the end of an iron umbrella rib to come in contact with the

\* *Medical Times and Gazette*, July 30th, 1859.

† *London Medical Gazette*, October, 1845.

‡ *Bristol Medico-Chirurgical Journal*, March, 1886.

intestines. The appearance presented is shown in the drawing Fig. 38. It is remarked:—

In this case the foreign body passed through the bladder into the peritoneal cavity for a distance of two inches, apparently without doing any harm. Phosphatic deposit was laid down on the metal in slight amount for half an inch outside the bladder, and this suggests that the walls of the bladder, as it filled and emptied, slipped up and down the instrument, giving opportunity of only intermittent incrustation. It is nothing short of marvellous that no escape of urine into the peritoneum should have taken place.

It seems hardly possible that such a state of affairs could have existed for so considerable a period as many months

without some leakage of urine into the cavity of the peritoneum at times taking place. There appear to be circumstances under which urine may enter the cavity of the peritoneum with impunity, and these I believe, in the case just recorded, are illustrated.

Passing to circumstances which may more easily arise out of more every-day experiences, the following case presents points of considerable interest:—

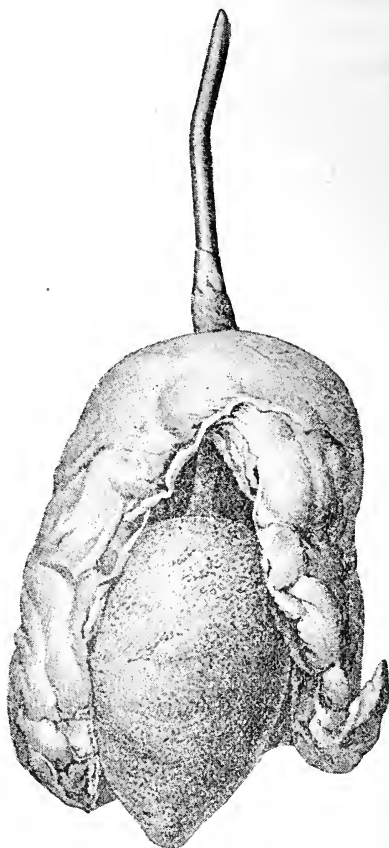


Fig. 38.

A gentleman, about fifty years of age, was referred to me by Dr. Cameron, in April, 1882, with a note that there was a formation or tumour about the base of the bladder which was palpable to the touch. His history pointed to intestinal irritation of some months standing. For six weeks he had suffered more or less from diarrhoea and irritability of the bladder, accompanied with considerable abdominal pain. His urine contained pus and air bubbles, and he noticed that micturition terminated with a sort of fizzing noise. There was considerable swelling corresponding with the fundus of the bladder. The mass was about as large as a cricket ball, and felt very much like a scirrhus. A sound passed into the bladder detected nothing abnormal. The urine was found to contain pus, air-globules, and evidently particles of food. Soothing applications were used. I did not venture a decided opinion at this stage, as I thought we should soon get a lead. About a fortnight after I saw him, the patient reported himself as being better, the swelling and irritability of the bladder were both less. The urine at times was distinctly coloured with fecal matter and contained, by the microscope, some of the elements of food. He stated that he had passed recently, with some trouble, by the urethra a mass about three-quarters of an inch long which he thought was a stone. This proved to be on examination the end of a rabbit's thigh-bone, which no doubt was swallowed; this being an article of diet—the rabbit, not the femur—which the patient was partial to. This proved to be the key to the whole case. The patient began to improve, the bladder swelling disappeared, and he rapidly convalesced and resumed his business. He has since enjoyed good health, but at times he is conscious of a little escape of wind into the bladder, and when his bowels are much relaxed there is also some fecal matter. Probably the fistulous communication has never completely closed.\*

The case was one of considerable interest. When it first came under my notice it seemed to present almost every feature usually associated with a malignant abdominal growth. Had I then committed myself to a diagnosis I hardly see how such a conclusion could have been avoided. The progress of the case and the lapse of time, both clearly shewed that such

\* *Liverpool Med. Chir. Journal*, January, 1884.

could not have been so, though the age of the patient, the gradual and ill-defined character of the early symptoms, the losing of flesh, and the ulcerous communication between the bladder and intestines, all seemed to point one way until the foreign body was discovered. How much the difficulties connected with the case would have been added to, so far as an explanation of the symptoms was concerned, had the bone been allowed to leave the urethra without being recognised.

Dr. Renaud, of Manchester, has kindly communicated to me a somewhat similar case which came under his observation, where, on the death of the patient from other causes, an examination of the parts was made. Dr. Renaud sent me the following extract from his note-book, accompanied with a drawing of the parts involved in the lesion I am now referring to :—

Mr. ———, aged 63, observed that his urine was surcharged with amorphous lithates for the space of one month, after which he noticed that micturition was frequently interrupted by an escape of air-bubbles through the urethra. Feeling sceptical, I asked him to void urine in my presence, and sure enough the sound of air bubbling was unmistakable. Two months later I noticed that the urine was a good deal loaded with mucus, and that some foreign substance was mixed up with it, which when placed under a microscope was found to be a mixture of granular cells, spiral vessels, etc. Nine months after the patient was first seen by Dr. Renaud he died, partly through gout and other causes, of which the symptoms here referred to did not represent an important element. The colon was found adherent to the fundus of the bladder, and some coils of bowel were glued together by old, and in one part, thickened adhesion. In this latter a cherry-stone was found lodged in a false diverticulum or puriform sac, which communicated with the colon by another opening. With this evidence before me, I hardly hesitated to conclude that the granular cells noticed five months ago represented a part of dis-integrated kernel of cherry-stone swallowed a long time previously.

With illustrations such as these before us, we cannot be surprised at almost anything that may turn up in the course of our examination of the urine. We must not forget in connec-

tion with this remark, that all sorts of deceptions have been practised by means of the urine. I not only refer to persons, for some extraordinary reasons best known to themselves, endeavouring thus to deceive medical practitioners, but to other instances where deceits of this kind are practised for the purpose of legal fraud. Practitioners cannot be too careful, where the statements are of a suspicious nature, in seeing the urine passed in their presence by the patient. In one case that incidentally came under my notice, I feel sure an attempt was contemplated in a life insurance examination to substitute the urine of another person. There was really no cause for this, but the individual referred to had been victimised by quacks, who had succeeded in extracting a considerable sum of money on the ground that he was passing his semen unnaturally, and I believe he merely felt ashamed at the nature of his alleged complaint. However, the case had its lesson in more ways than one.

The female bladder is frequently found to contain various foreign bodies. Some years ago, by means of a pair of fine dressing forceps, I removed a bodkin, which had been introduced by the patient for the purpose, it was alleged, of extracting a piece of gravel from the urethra.

A case of this kind was narrated by Dr. Grimsdale, at the Medical Society in 1865, where he had removed a calculous concretion, formed on a large hair-pin, from the bladder of a young lady, aged fifteen years. Removal of the foreign body was effected with forceps, after rapidly dilating the urethra with a Weiss's dilator. On the second day after the operation she was able to pass water voluntarily; recovery followed, the patient possessing full power over the bladder. In this instance there was some tumefaction above and to the left side of the symphysis pubis, as if an abscess were impending. It is probable that the foreign body might have been expelled in this way had not its removal been effected by surgical interference.

The museum of the College also contains a hair-pin (E 22)

which was removed by Mr. Bickersteth, by rapid dilatation, from the bladder of a female. Hair-pins appear to be rather favourite articles for passing into the female bladder, as I see another case of this kind is recorded by Dr. Johnson.\* As, in cases of stone, operations on the female bladder where the urethra is incised are apt to be followed by incontinence of urine, dilatation of the urethra should be employed for the removal of all small bodies. Where the calculus, or foreign body, is too large for extraction entire in this manner, lithotripsy may be advantageously combined.

\* *British Medical Journal*, Sept. 27, 1879.

## EIGHTEENTH LECTURE.

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### IRRITABLE BLADDER.

THE term "irritable bladder" has been used to express a disease rather than a symptom, and hence some confusion has arisen in the application of therapeutics to the condition upon which this perverted function depends. It is as important to define accurately the circumstances which give rise to this irritability in the bladder as it would be if we were to proceed to discuss, with a view to their treatment, the causes producing a similar symptom in any other organ, such, for instance, as the eye. To prescribe correctly for an irritable bladder, the same careful consideration of the pathology of the subject is required as is needed in the more obvious illustration I have taken.

For the sake of clearness let me define what we understand by the term, and then I will endeavour to notice under what circumstances we meet with the condition. In this way I shall hope to apply, to some purpose, principles of treatment which may be of service in enabling us to remedy not only a very distressing, but a very common symptom. Let us clearly understand, then, that in cases of irritability of the bladder we do not commit ourselves to attempting to correct this ailment until we have asked the question—What is the cause of it? It will be quite time enough to be empirical in our advice when we have failed to satisfy ourselves upon this point.

The term "irritability of the bladder" is understood to mean that the act of micturition is performed unnaturally often. I do not attempt to qualify this somewhat broad definition

by any statement as to the number of times a healthy person should micturate in the twenty-four hours. There are variations dependent upon circumstances and individual peculiarities which would render such an attempt almost ridiculous, and therefore unless a person were in some manner inconvenienced by the frequency with which the act was performed, I should not hold that he was suffering from irritability. Irritability of the bladder is traceable to one or other, and sometimes to more than one, of the following conditions: nerve, habit, reflected action, structural diseases, including tumours and calculous disorders, and abnormal states of the urine.

In a given case of irritable bladder, if you will go through these headings carefully and systematically, you will probably succeed in doing that which others may have failed in elucidating. If you do not take up the enquiry in some such methodical manner, it is not at all improbable that you will miss your mark, and then have—as is quite within your right, if your system, whatever it may be, fails—to fall back upon empiricism.

Now, you may possibly ask, What do you mean by “nerve” as determining an irritable condition of the bladder? I mean just what you do when you make use of the term in its ordinary acceptance—“a nervous man.” You will find a certain proportion of cases of irritable bladder simply due to this condition—not to disease, but to the nerve tone of the individual. I have known many persons, in anticipation, for instance, of a long railway journey, go on for days previously micturating every few minutes, in view of an imaginary inconvenience to which they might be temporarily exposed. These individuals are simply nervous upon this point, and acquire a habit which sometimes becomes permanently established. “Nerve” and then “habit” will produce a state of urinary irritability which it is exceedingly difficult to throw off. For many years I was constantly consulted by an elderly gentleman who suffered in this way; the dread of the fortnightly journey to London for

business purposes manifested itself thus until a habit was acquired which seriously threatened the patient's health, and yet there was nothing but these combined influences to explain matters. All sorts of expedients only seemed to add to his distress for fear of their failing, until on the introduction of the more rational system of railway carriages I suggested their use, which was at once followed by a total cessation of this unpleasant symptom.

You have often no other objective symptoms in these cases to guide you; the history of the patient, the circumstances influencing him, together with that important assistance which is afforded by the method of investigation known as the process of exclusion, will be your guide. Before coming to the conclusion that the case is one of "nerve," or of "habit," or of both, you must fortify yourself with the assurance that there is a complete absence of all signs of structural disease. Having satisfied yourself as to the cause, what is to be done for these patients? as, from the varying circumstances attending these cases, you cannot cure them all by a Pullman carriage. You will employ the same principles of treatment as you would, with obvious modifications, in any other like form of nervous disorder. In the first place, you will explain to the patient his position, and give him substantial reasons for the view you are taking. The employment of a little unvarnished common sense in these cases, shaped in reference to the peculiar dread the patient may have, and which has induced the irritability or added to it, will often avail much. As soon as your patient finds out that you know as much about his unpleasant sensations as if you had the complaint yourself, you will be able to exercise an influence for good over him which he will not be long in acknowledging. In no other way will you be able to give your patient the assurance he requires.

The strange vagaries one meets with sometimes in connection with disorders of the urinary organs may possibly occasionally try your patience. It was only a short time ago

that a patient presented me with a very elaborate table, in which he had positively noted by his watch the number of seconds he took to perform each act of micturition; these he worked out mathematically, and furnished me with the ratios of time to quantity of urine, and asked me to explain certain differences which appeared to him very terrible and ominous. Yet he was sane, and only asked for information which I took pains to give, and thus to satisfy him. And so you must do in all these allied affections, for affections they most certainly are.

In addition, however, these cases require, and are benefitted by, all those medicines whose power in toning the nervous system is so well known. I speak generally of the preparations of iron, nux vomica, strychnia, and phosphorus. I have sometimes found the bromide of ammonium, in twenty to thirty grain doses in water, three times a day, act almost as a specific in this condition. Of the solution of the dialysed iron I can speak favourably, as strengthening nerve power without disturbing the digestive functions. On the use of aperients, of baths, and of suitable diet, both in eating and drinking, I need not insist, as these are essential in promoting both nerve and physique generally.

Persons who have had any reason, however slight, for believing that they suffer from stricture, not unfrequently develop irritable bladders. I have seen this follow upon all kinds of misapplied constructions relating to normal acts of micturition; upon the unskilful introduction of instruments undertaken with the object of removing such doubts; or a groundless dread of inability to void urine, inducing a frequency in the act which has eventually resulted in the setting up of irritability of the bladder. It is astonishing how many persons may be completely cured of this symptom by demonstrating to them the ease with which a bougie may be made to enter the bladder.

Irritability of the bladder, dependent upon reflected action, is most commonly met with in children and young persons.

Illustrations of this class are furnished by the irritability that occasionally attends the presence of intestinal worms, and similarly I have known the cutting of a tooth in a child produce the same effects. In youths particularly, and even in those of a more advanced age, a constant desire to micturate may be kept up by an elongated or adherent prepuce. The retention and decomposition of the preputial secretion, by setting up inflammation, indicates this as the probable cause. For this condition, the operation of circumcision and separation of adhesions at once removes the source of complaint. How it is that irritability of the bladder is caused by the reflected action

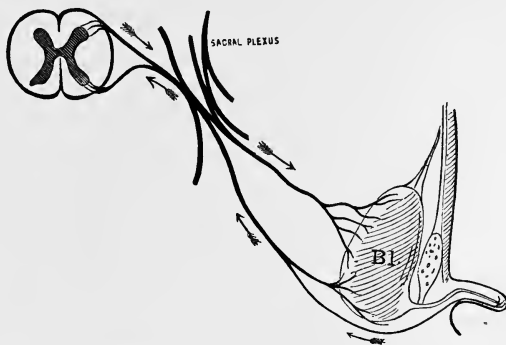


Fig. 39.

which a long or tight prepuce sets up, and conversely, why pain is felt at the end of the penis when there is a stone in the bladder, are well illustrated by Mr. Edmund Owen in the accompanying Plate.\* (Fig. 39.)

Irritability dependent upon structural changes in the urinary organs, growths, and calculous affections, is with these a most frequent concomitant; nor are these causes entirely confined to those diseases of the urinary organs which custom has brought more especially into the hands of the surgeon.

\* Harveian Lecture. *British Medical Journal*, Feb. 28, 1880.

Certain forms and stages of purely renal affections do not seldom give rise to this symptom. Whether in these instances the irritation is merely reflected or is directly due to some alteration in the urine, is an inquiry I do not intend entering upon; it is sufficient here to remember that such may be the cause, whatever may be the explanation.

Passing to the bladder, we find that in some period of their course all growths give rise to irritability, in addition to other symptoms indicative of their presence. Similarly, irritation is provoked by enlargement of the prostate, particularly at the commencement of the disease. At this stage it would be more correct to speak of it as senile engorgement of the prostatic veins, a condition which often precedes the structural enlargement of the part with which we are familiar. The irritability connected with prostatic engorgement shows itself chiefly at night. The patient is perfectly well during the day, but as soon as he gets into bed he experiences a desire to pass water, which further disturbs his rest by provoking another call after intervals of varying extent; or it may show itself by inducing a state of more or less priapism, which equally interferes with sleep. In this condition, physical examination with the finger in the rectum, or by a catheter in the bladder, frequently fails to detect any signs of prostatic hypertrophy; possibly all that may be noted is a distended or varicose condition of the veins immediately in front of the finger. Provided, as is usually the case, there is nothing in the state of the urine to account for it, I have known some very simple expedients of service in remedying, if not entirely putting a stop to, this symptom. The wearing of warm socks at night, or the use of a hot bottle to the feet, by determining the blood to the legs, is often found of considerable service—a fact which leads me to believe that the appearance of this symptom only at night is due to some alteration in the venous condition of the part by reason of the change in position. That form of residual urine which so often precedes physical signs of prostatic hypertrophy

is frequently an overlooked cause of bladder irritability. It will be again referred to.

Senile engorgement and hypertrophy of the prostate not only follow in succession, but the two conditions frequently co-exist. Irritability of the bladder, due to an enlarging prostate, is usually determined without difficulty by physical examination. It will be noticed that the irritability of hypertrophy varies somewhat in the precise mode of its causation. In the earlier form of the enlargement, especially in gouty subjects passing highly acid urine, the irritation comes on immediately after the bladder has been emptied, and the desire will remain for an hour or so until some urine has collected, and a water-bed is as it were interposed between the muscular pressure of the bladder and the tender or gouty prostate. Then there is an interval of repose until the urine is again passed, when the same process, accompanied by similar sensations, is experienced. The irritability of the subsequent stages of prostatic enlargement is somewhat different in its character, being due to residual urine plus the chronic cystitis which the pathological state of uncleanness has engendered. The difference has this import—the former is aggravated by catheterism, as usually practiced, whilst the latter is remedied by it, combined with irrigation of the bladder; and conversely, sedatives and emollients give relief to the first-mentioned form of irritability, whilst in the latter they are, alone, useless.

It is difficult to explain some of the forms of irritable bladder which are evidently connected with prostatic hypertrophy and the sacculation of the bladder, particularly about the neck, which is so frequently associated with it. I believe, however, that it is more mechanical in its production under these circumstances than is generally believed. In a case I examined after death, the symptoms of sudden irritability appeared to be due (1) to a collection of urine above the prostate, and, (2) to the sudden emptying of the collection into the prostatic urethra by a sort of syphon, or spout-like action,

as soon as the level of one of the channels permeating the prostate into the urethra had been reached. This could be imitated on the dead subject, and seemed to account for the suddenness with which micturition had to be accomplished, and the impulses that followed changes in the position of the body. These sudden impulses to urinate are the most distressing symptoms in some individuals with enlarged prostates. The view that they are largely due to the causes I have indicated is strengthened by the great improvement that is often effected in this respect by purely mechanical treatment. This will be referred to again later on. Patients suffering from prostatic irritability sometimes express amazement at the fact that though the desire to micturate was so great and so urgent the result of their attempt was so very insignificant. A very small amount of urine lingering in the prostatic urethra will often occasion sensations quite out of proportion to its amount. This point may be readily tested with a soft catheter.

Some years ago I described \* a pathological condition of the neck of the bladder which came under my notice in the *post-mortem* room when examining the body of a male adult who had suffered from urinary irritability. I refer to a crack or fissure, commencing in the prostatic urethra and involving the vesical orifice.

“Though I noted its resemblance to other abrasions of a like kind commonly met with in the rectum, the termination of the male and female urethra, and the mouth, I did not then fully appreciate its possible significance. Since then, in practice, I feel sure it has often come under my notice chiefly as a cause of irritable bladder. Many patients whose bladders are diligently searched for stone by every surgeon they consult, furnish illustrations of this little recognised affection.

The symptoms of fissure of the vesical orifice are analagous to those observed elsewhere. There is pain on micturition, and a sensation of contraction and dilation at the close of the act, accompanied with a sharp stinging pain behind the scrotum which is very significant. Occasionally a few drops of blood escape as micturition terminates. The pain varies in degree in the same patient, being intense when the urine is highly acid

\* *Liverpool Med. Chir. Journal*, July, 1882, p. 243.

and less so when it is neutral or alkaline. Examination of the prostate by the rectum invariably produces on pressure a sharp sensation as if a knife were piercing the part. Similarly, the passing of a sound into the bladder is distressing. Occasionally these cases are referred to some gouty or rheumatic disorder; by the French the term *contracture du col vésical* often includes them. When this affection is considered to be traceable to either gout or rheumatism, the patient is almost invariably placed on an alkaline treatment with decided advantage, for the reason already mentioned. The improvement is, however, only temporary, and is directly traceable to the altered reaction of the urine. Vesical fissure is, however, seldom cured, though it may be palliated by such means; in addition, rest and the application of a weak solution of nitrate of silver directly to the prostatic urethra are sometimes effectual. On more than one occasion I have succeeded in effecting permanent benefit by temporarily paralysing the sphincter action of the neck of the bladder. The relief that immediately follows cystotomy in vesical fissure, otherwise irremediable, justifies the risk of a proceeding which is considerably less than that attending many other operations more frequently and less hesitatingly performed. Spiegelberg \* has also discussed this condition."

Irritability of the bladder in children and adults is a usual symptom of stone, though it varies much both in kind and degree. There is this difference in the bladder irritability of stone which has often struck me: in most other forms of irritability a patient gives way to it, at all events, with the prospect of a temporary relief; whilst in stone, on the contrary, it happens with the certainty of having his suffering increased.

Some time ago I was seeing a gentleman for irritability of bladder, who I strongly suspected was suffering from stone. I had searched his bladder with a sound, and also with a catheter, for a cause, but, like others, in vain. One day I was examining him with a prostatic catheter after I had previously, as I thought, emptied the bladder of all the urine it contained, when, in moving the instrument about, I felt it suddenly pass over something with a jerk, and then, on gently pressing it, it went a couple of inches further in. This was followed by the discharge of about two ounces of urine, which struck me as being unusually

\* *Principles of Surgery*, by J. Ashhurst; 3rd Ed., Philadelphia, 1883.

milky-looking. There was no bleeding. My friend went home, pondering over a suggestion that I made to him—that his irritability was due to a sacculation, in which urine lodged, and which we had accidentally discovered; at all events, he was immediately relieved, and remained so for forty-eight hours, when the feeling of irritability returned. Having had some experience in catheterising himself, he at once passed the instrument which I had lent him, and having drawn off some water that he had purposely retained, he began cautiously to grope about his bladder, with precisely the same result as had happened to me. The patient came to the same conclusion that I had—namely, that he had a sacculated bladder, and being an ingenious man, he devised a stylet by which he could readily pass his catheter into the secondary receptacle. When I saw him last, accidentally, he informed me that by this way, passing an instrument for himself from time to time, he was completely cured of this irritability, and he believed that the sacculation had almost, if not entirely, disappeared. Such, then, is an illustration of irritability dependent upon urine retained in a secondary bladder or receptacle. I am afraid you will not find all such cases so satisfactorily remedied. Apart from its extremely interesting nature, the case is worth remembering as exemplifying the kind of irritability you may expect to have under these circumstances.

The diagnosis of sacculated bladder is not always easily made. When suspected, it is not a bad plan, after catheterising the patient, say when recumbent and having emptied his bladder, to alter his position by making him stand, and then seeing if more urine escapes on moving the catheter gently about; or the order in position may be reversed. Guthrie mentions the case of a gentleman in whom the existence of one or more pouches in the bladder was determined by injecting the bladder with warm water; on withdrawing it only a portion could be obtained, and rarely the whole of it, even by any change of position.\*

\* *Op. cit.*, p. 30.

Stricture of the urethra is not uncommonly attended with some degree of irritability. In the earlier form of stricture this is due to disturbed muscular action, but in the latter forms of the disease it is due to those changes in the walls of the bladder to which reference has been made. The bladder becomes so structurally altered as to be unable to perform its function. It is interesting to notice how long the irritable condition of the bladder will remain after the stricture has been remedied and the urethra dilated to its natural size; that is to say, how long the small thickened bladder will take to again adapt itself to the ordinary emergencies of micturition. In the majority of individuals it does so adapt itself, but in others it continues to be irritable long after the stricture has been completely relieved. In some cases I have endeavoured to remove this trouble by the use of sedatives locally, and so to make the bladder more tolerant of its contents. In two or three instances I have tried the effects of a solution of borax introduced into the bladder, so as to exercise a hydrostatic pressure on its walls, by means of the funnel and elastic tubing devised for the purpose of irrigation, and I have found benefit from this.

Lastly, I have had to resort to cystotomy, the irritability remaining, after the stricture has been to all intents and purposes cured, being intolerable to the patient. Twice I have performed median cystotomy under these circumstances, thus permitting the urine to escape continuously by the perinæal wound. It may be asked, What is the rationale of this? How are you going to make a bladder tolerant of urine by not allowing any urine to collect in it for an interval of two or three weeks, or even more? My answer to this is, that the continuance of the irritability after the stricture has been cured is due to the considerable concentric hypertrophy which the bladder has undergone in its constant endeavours to force the urine through the obstruction in front of it. What is the effect of preventing for a time a muscle exercising its power of contractility? Atrophy, or loss of muscularity. This is only an exemplifica-

tion of an established physiological law; and so it is with the hypertrophied bladder, as I have in practice proved to be the case. In a recent instance of this kind the particulars were as follows :—

W. J., aged 49, was re-admitted into the Infirmary under my care on Feb. 21, 1879, having previously been treated by me for an old-standing stricture with irritability of the bladder. After his stricture had been fully dilated, I told him that it was probable in the course of a short time his bladder would adapt itself to the improved state of the urethra, and again become tolerant. This, I explained to him, was the rule in such cases, and I advised him to maintain his improvement by the occasional introduction of a bougie. In spite of this, the irritability continued, and he was re-admitted to the Infirmary on the date mentioned. On examination, I found his urethra capable of receiving a large bougie, but his bladder was thickened, and so contracted that I did not think it would hold an ounce of fluid. I tried several expedients, mechanical and medicinal, to remedy this state of things, but without avail. His condition of irritability, both by night and day, was quite as bad as anything of the kind I had ever seen. I therefore resolved temporarily to paralyse the bladder by the performance of median cystotomy, which I did, with Mr. Rushton Parker's assistance, on April 2, 1879. On passing my finger into the bladder, nothing further than what has been noticed could be felt. I should have mentioned that the irritation felt by the patient at the end of his penis was so severe as to have led him, in endeavouring to relieve himself, to scratch his glans until a deep sore was formed, as large as a sixpence, by the side of the meatus. Immediately after the operation the sore began to heal, and on April 15th it is noted by my dresser (Mr. Renner) that "the sore on the glans penis has completely healed." The operation was followed by complete relief, the patient, for the first time for many months, and without anodynes, obtaining sound sleep; in fact, he appeared to be making up lost time, as in addition to his nights, he spent most of his days in sleep. On April 25th, urine, for the first time, began to pass along the urethra, and by the 30th the perinæal wound had completely healed. The patient left the Infirmary very greatly improved; though passing his urine more frequently than usual, he was quite free from those spasmodic pains connected with the irritability which distressed him so much. I have since heard that the improvement continues.

And now I will proceed to notice the irritability that is due to altered and abnormal states of the urine. This is not infrequent, and will necessitate, where there are grounds for suspicion or symptoms to be cleared up, such an examination of this excretion as I have referred to in another lecture. The urine least irritating to the urinary passages is that which most nearly approaches what we have taken as a healthy standard. The low specific gravity of the urine that is passed so frequently and abundantly by hysterical females no doubt causes the irritability of the bladder from which they, under these circumstances, almost invariably suffer. Water is more irritating to those passages of the body over which it is not intended to flow, than a saline solution of some density. The abundance of uric acid in the urine of the gouty undoubtedly explains the extreme irritability of the bladder, and the intense irritation and feeling of weight these persons experience and refer to the region of the prostate. My opinion is that gouty manifestations in the parts behind the triangular ligament are quite as frequent as the more familiar indication of this diathesis which we meet with in an acute form about the ball of the toe. The benefit that attends the administration of gout remedies in these cases, together with diluents, is most marked. I believe that something similar is seen in persons who frequently suffer from gouty appearances in the skin, such as eczema. I have a patient, undoubtedly gouty, who successively suffers from eczema and irritability of the bladder. Neither is present to any degree at the same time, and the one seems to be the alternative of the other. It is not my intention to follow this enquiry further; I merely wished to remind you how it was that abnormal conditions of urine might explain the symptom we are now considering, and that the correction of this flaw would most probably remove it.

There is a form of irritability—for so it certainly is, though manifesting itself by actions rather than by sensations which are morbid—where the bladder is not under proper control. I

allude to the nocturnal incontinence of young children, which may be provoked by causes previously mentioned, which must be carefully sought for. This state is not to be mistaken for the dribbling or running over of a distended bladder, which, by atrophy of its muscular coat or other similar cause, is prevented expelling its contents. Whenever we hear of incontinence in an adult we must be alive to this, and not allow the actual condition of the bladder to pass unexplored. The incontinence of childhood is a very common and sometimes troublesome complaint, and, when not due to any of the causes I have indicated, is probably connected with an atonic condition of the walls of the bladder, manifesting itself when the voluntary controlling muscles of micturition are temporarily in abeyance, as in sleep. In the management of these cases, I place reliance chiefly upon inculcating habits of regularity in attending to such children, combined with medicinal treatment. Of the drugs in which I have the greatest confidence, I may mention belladonna and its alkaloid atropine.\* I have seldom found these fail, remembering to employ them on the principle "that chronic diseases need chronic therapeutics." I am aware that a variety of mechanical means have been adapted for the treatment of this affection, such as jugums or urethral compressors, and closing the meatus with collodion, as suggested by Sir Dominic Corrigan.† Of these I think the latter is the least hurtful, and may occasionally, when other means have failed, be resorted to with advantage. Attention to the diet is very necessary in these cases; irregularities both in eating and drinking are often attended with a condition of urine that is likely to provoke incontinence. A strictly milk diet has in some

\* I find the following formula useful in these cases:—

℞ Atropiæ, gr. i.  
 Acid. Acet., gtt. iv.  
 Alcohol,  
 Aquæ, aa ʒiv.

M. Four drops before each meal in a wineglass full of water.

† *Dublin Quarterly Journal*, February, 1870.

instances that have come under my notice been sufficient to effect a cure.

There is a form of irritability of the bladder which is frequently met with, especially in highly intelligent and sensitive children, at about the age of ten or eleven years, when they are entering upon the sterner forms of educational study. On examination of the urine it will be found loaded with phosphates. In remedying this condition, bromides in combination with quinine will be found invaluable. Care must be taken in these cases that the child is not submitted to an undue amount of nerve tension by reason of his educational studies.

Lastly, I would remind you that irritability of the bladder is a symptom which is by no means confined to the male sex; it is frequently met with in females. In the same methodical manner that has already been insisted upon, the causes of the irritation must be carefully searched out, not forgetting that in females the condition of the uterus or of the rectum frequently affords a sufficient explanation. There is a cause of irritability and spasm of the bladder in females which, though uncommon, is not, I think, sufficiently recognised. I have met with some examples of it, and have found it just as satisfactory to treat as an affection somewhat analogous—namely, fissure of the anus. Ocular examination readily determines the existence of such a cause as this; the irritable appearance of a fissure at the orifice of the urethra is enough to account for the extreme sensitiveness of which the patient complains. Failing its cure by a few applications of nitrate of silver, I have found rapid dilatation of the urethra sufficient to afford relief.

An occasional cause of irritable bladder in the female is a vascular condition of the orifice of the urethra. To these little sensitive growths the term *caruncle* has been applied. They will often be found extremely sensitive and the cause of various reflex actions, of which frequent micturition is the most common. The only way of removing them is with nitric acid, or by snipping them off with scissors. This, of course, should be

done under an anæsthetic. Dr. Goodell uses the actual cautery where excision cannot be practised. He closes a communication on this subject with the following remark :—"Once in awhile, in treating a woman for another disease, you will come across a caruncle, and you may be tempted to remove it ; but let well alone, and do not touch it unless you know it to be one of the painful kind. The suffering caused by them bears no relation whatever to their size, and unless the symptoms are aggravated, it is best not to touch them."\*

We have been accustomed to regard an irritable bladder as a purely functional disturbance so far as this viscus is concerned, and for the most part it is ; but we must not forget that the constant contraction of the bladder may produce changes behind it which follow as a consequence of urine-pressure—I mean dilatation of the ureters and of the pelvis of the kidney. I have seen this occur where there was nothing to account for these changes other than the obstacle to the escape of the urine which a constantly contracted bladder presented. This fact is suggestive of the necessity in extreme cases of contracted bladder of maintaining for some time a means of free escape for the urine, either by the retention of a catheter, or by cystotomy, in addition to the general measures advocated.

\* *Philadelphia Medical Times*, Dec. 17, 1881.

## NINETEENTH LECTURE.

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### HÆMATURIA.

HÆMATURIA or blood in the urine, like irritability of the bladder, though only a symptom of disease or injury, is one of such frequency in connection with disorders of the genito-urinary apparatus, and is so significant, that it requires some general consideration apart from those incidental allusions to it which must necessarily be made in other parts of this course.

It is naturally a prominent symptom, and on its appearance often seems to arouse, for the first time, the attention of the patient, and to cause him to seek professional assistance. It may be unimportant and readily rectified; whilst, on the other hand, it may portend, or be associated with, mischief of the gravest kind. In commenting upon hæmaturia in this general way, it will be as well to look at it in the light that it is usually presented to us. A patient comes to us and says, I think I passed blood, or what I believe to be blood, in my urine, or, as in the act of micturition. Such a statement as this leads to the rejoinders, Was it blood? and What are the precise circumstances under which it was passed? We will now proceed briefly to pass in review as reminders the circumstances under which blood may appear in the urine, with some illustrations.

*Kidneys.*—Blood from the kidneys is, as a rule, intimately mixed with the urine, giving it an appearance of thin porter, or rendering it, as it is termed, smoky. Though occurring under other circumstances, as in certain forms of Bright's disease, and in cachectic conditions, such as purpuric scurvy, as well as in fevers, its relation to the kidney as a symptom is for the

most part of surgical significance. We meet with it as the result of severe injuries applied over the region of the kidneys, where some rupture of the organ has been occasioned. A very large amount of blood may be lost in this way. In Dr. Rawdon's case, which occurred in a child from an injury, the amount was so excessive as to cause the bladder to become blocked up with clots. Nephrectomy was eventually resorted to, when the kidney was found almost torn across. Hæmaturia is frequently met with in connection with renal colic and the movement of stones from the kidneys downwards. In some cases this has proved considerable; there is usually no difficulty in diagnosing this. Hæmaturia is not unfrequently met with in early childhood in connection with the growth of tumours of the kidney; the absence of this symptom, under these circumstances, is sometimes to be explained by the pressure of the growing mass upon the ureter, and its consequent obliteration.

It must not be forgotten that congestion of the kidney will sometimes be relieved by a smart attack of hæmaturia. I have seen this on several occasions, having been called to treat it surgically by reason of clots being retained in the bladder, and by their decomposition setting up cystitis. In one of these instances the patient is subject to these attacks on exposure to cold; in two others, curiously enough, it followed excessive indulgence in asparagus. I refer to these incidentally, as showing how cases of renal bleeding may require the attention both of the surgeon as well as of the physician for their relief. The explanation why the first mentioned patient does not succeed in getting rid of the blood from the bladder is that his powers of micturition are not the best under ordinary circumstances, by reason of some enlargement of the prostate, hence he requires surgical assistance. Hæmorrhage from the kidney sometimes gives rise to very severe attacks of vesical colic.

In 1883, I saw a gentleman, aged sixty. He suffered from renal hæmaturia, followed by severe pain over the region of the bladder. This was followed by the passing of blood and clots, and afterwards

by the sensation of complete relief. He always knew when he was going to pass blood by the sensation of his bladder filling, followed by acute pains over the supra-pubic region until the blood was voided. Then he would go on fairly well until another attack of the same. He had some enlargement of the prostate, but did not require surgical interference.

When blood thus becomes clotted in the bladder it may be left to escape spontaneously, provided it occasions no symptoms either of pain, retention, or cystitis. If such be the case, then it may be conveniently removed with a large-eyed catheter and Clover's suction apparatus. I have found this to be the best. As a rule, blood which in this way becomes retained in the bladder occasions no further trouble. Blood occasionally forms the nucleus of stone in the bladder. I have twice removed phosphatic calculi with friable sort of network centres, which I had little doubt represented the remains of previous clots.

Mr. Cadge\* mentions a case where he removed a stone weighing two ounces from a man who had twice been in hospital under the care of the physicians. The stone broke in the forceps, and large quantities of black material, like cinders, came away mixed with scales of calculous matter. It was found to be composed of alternate layers of dried blood and stone, with a nucleus of oxalate of lime.

Lastly, I must not forget to mention a serious form of renal hæmaturia which once came under my notice. It was in a case of villous tumour of the bladder, about which there could be no doubt, as a portion of the growth was removed and submitted to microscopical examination. It was proposed to open the bladder for the purpose of exploring and, if possible, removing the tumour. This, however, was not done. After death the pelvis of one of the kidneys was found filled with a similar growth. The use of the microscope must not be omitted in doubtful cases of renal hæmaturia, as valuable information may thus be afforded.

\* *Hunterian Lectures*, 1886.

*Ureters.*—Hæmorrhage from the ureters is in many respects like that from the kidney. I have known it occur from injuries directly applied over the ureters, from tubercle deposited in them, and during the passage of calculi along them. The blood, as a rule, is intimately mixed with the urine, and, as with renal hæmaturia, casts of the ureters, more or less complete, looking like red earth worms, may sometimes be seen in the excretion. Hilton was in the habit of advising that all clots in urine should be floated, for the purpose of seeing if these indicated from whence they came.

*The Bladder.*—Hæmorrhage from this locality is generally indicated by the blood appearing at times unmixed with the urine and in clots of various sizes and shapes. In diagnosing blood from the bladder we have, as a rule, the absence of symptoms which would point to the kidneys as its source. Much reliance must be placed upon the physical examination of the bladder with the sound or catheter. In using either of these instruments for diagnostic purposes, it is hardly necessary to say that every precaution should be taken against doing harm in attempting to do good. A bleeding bladder, from whatever source, is not likely to bleed less after a sound has been manipulated within it; this is in itself a source of information as to the place from whence the hæmorrhage comes. When using a sound or catheter where the bladder bleeds at all freely, before removing the latter instrument, I throw in with an elastic bottle a few ounces of tepid water, taking care, if possible, to go away from my examination with the bladder left clean and empty. A clean bladder is not likely to originate or add to a cystitis, whilst a contracted viscus is the best safeguard against any further hæmorrhage taking place. I believe that the almost invariable cessation of bleeding from tumours of the bladder which follows cystotomy and drainage is due to our having substituted a continually contracted bladder for a flaccid one. Tumours of the bladder all bleed sooner or later, and, though we cannot always feel them with the sound, the fact that

the hæmorrhage is temporarily increased by the manipulation is in itself significant. Stone in the bladder sometimes gives rise to hæmorrhage; why this should be is readily explainable. It is curious, however, that some of the roughest stones I have removed were the least painful to the patient. Stones with sharp projections, such as are composed of oxalates, seldom move about much. I suppose their prominences render them more or less stationary.

A patient who recently came under my care, always noticed that after long walking exercise, which he invariably took one afternoon a week, there was blood in his urine. I examined him and found a stone, though none had been suspected. Its successful removal by lithotrity at once put a stop to this symptom. Hæmaturia in children is more frequently caused by stone and tumours than by anything else. There is a form of hæmorrhagic cystitis which is now rarely seen, thanks to the improved management of the broken stone after lithotrity. A suddenly emptied bladder—I refer to the atonied viscus—will often bleed as soon as it is deprived of the support afforded by its contents. The presence of blood and ammoniacal urine kept at the temperature of the body, is quite sufficient to account for some of the cases of catheter fever we hear of. It should be remembered that an atonied bladder will sometimes exude blood, though no damage is done to it by the instrument.

In localising the source of hæmaturia assistance may often be rendered by emptying the bladder with a soft catheter, and then throwing in an ounce or so of tepid water. If this returns blood-stained immediately upon its introduction, the bladder or prostate will probably be the locality of the bleeding. If this manipulation is delicately executed valuable assistance may be often rendered by it.

*The Urethra.*—This canal may be the source of hæmorrhage in the elderly, as the large prostate will sometimes bleed after exposure to cold, such as may follow sitting on a damp seat or in wet clothes. The occurrence of bleeding under

such circumstances is sufficient to indicate that the prostate requires looking after, otherwise more permanent trouble may follow. Bleeding of the urethra from gonorrhœa, and from the irritation caused by a stricture, illustrate other phases of this symptom; whilst blows on the perinæum, and contusion or rupture of the urethra, furnish examples of traumatism where there is but little difficulty in tracing the symptom to its proper source. It is hardly necessary to specify the improper use of urethral instruments—often by the patient himself—or strong urethral injections, as causes of hæmorrhage from this canal.

There is a form of hæmaturia which is traceable to the presence of a parasite, named the *Bilharzia hæmatobia*; to this reference will be made in a subsequent lecture in connection with some specimens illustrative of it.

Hæmaturia must not be confounded with a paroxysmal affection to which the terms hæmoglobinuria and hæmatinuria have been employed; in these conditions, blood corpuscles appear to be invariably absent, or are in a mutilated and hardly recognizable form. The spectroscope has been used for demonstrating the presence of hæmoglobulin, which is freed by the dissolution of the blood, and in which process the urinary system appears to be only passively engaged. Somewhat similar changes are observed in scurvy, purpura, typhoid, and other hæmic disorders.

I will now proceed to illustrate what I would speak of as the surgical treatment of hæmaturia. This is a wider subject than at first sight appears, as it may be said to include much of what has recently been done in the treatment of tumours and excrescences connected with the interior of the bladder and the prostate. The surgical treatment of hæmaturia can only be said to commence when the resources of medicine—frequently sufficient in themselves—have proved of no further avail, and thus this category of cases is not a large one.

It must be exceedingly rare for any condition of the kidney to occur where for bleeding alone an operation is indicated. I

will very briefly refer to cases which have come under my notice where anything of this kind, with the view of stopping dangerous bleeding from the kidney, has either been entertained or practised.

In 1870 a patient was in the infirmary who, in addition to a compound fracture of the leg, had sustained an injury to his back by falling across some scaffolding from a great height. He died three weeks afterward pyæmic, and exhausted from profuse hæmaturia. The expediency of cutting down upon the kidney was then discussed, but was not entertained, by reason of the impossibility of determining which organ was involved. A *post-mortem* examination showed a transverse gash of the right kidney almost dividing the ureter.

Though I have since seen several cases of severe traumatic renal hæmaturia, I have not met with any other example where the bleeding might have been advantageously dealt with by exploration, and possibly further by nephrectomy, either partial or complete. Some years ago I saw a case of malignant tumour of the kidney in a young person, which was at intervals attended with profuse hæmaturia. Here, I believe, ligature of the ureter, which was practicable, would have saved the patient from much distress, and was justifiable in the absence of other means for arresting hæmorrhage.

The impaction of a calculus within the kidney is sometimes attended with serious and persistent hæmorrhage, but I have not met with it alone of sufficient extent to require an operation to remove the cause of it, though when combined with other symptoms, it has indicated the necessity for nephrolithotomy, which has frequently been successfully practised.

Whether a partial rupture of a ureter is capable of keeping up a hæmorrhage for some time, I am doubtful. It could, however, hardly be of a nature or a degree to require direct operative interference. I think we may conclude that, though as a rule renal hæmorrhage can be best treated by medical measures, there yet remain some exceptional instances where,

from the profuseness and continuance of the bleeding, operative means may be resorted to; these would include, from the illustrations referred to, nephrectomy for ruptures of the kidney, and ligature of the ureter for hæmorrhagic conditions of the organ unattended with breach of surface, and where the indications were clear as to the kidney at fault.

In the bladder and prostate will be found conditions occasioning hæmorrhage where direct surgical treatment is more generally applicable, as these organs not only can be readily reached with the finger, but are less influenced by hæmostatics than the kidney. The treatment of tumours of the bladder to a large extent resolves itself into the treatment of the hæmorrhage which these growths so frequently occasion; in fact, it may be said that a growth within the bladder, which neither bleeds nor pains, cannot be said to present any adequate reason either for its exploration or removal. Though hæmorrhage from the bladder is an important and tolerably constant symptom of a tumour connected with this viscus, it must not as such be regarded as indicating that less potent measures than those of an operative kind are unavailing. I now possess two specimens of small portions of villous growth where, after long periods of recurring hæmaturia, complete recovery has, I believe, in both instances taken place; on the other hand, an observation of this kind is encouraging in urging the attempt to remove these growths by operation when further delay becomes obviously dangerous. We must not forget that a very small vascular growth in the bladder may keep up a serious hæmorrhage—a growth which it is impossible to feel until the finger is placed actually in contact with it. That such a cause for bleeding was present in the following case of stone in the bladder I have not the least doubt:—

J.S., æt. 28, was operated on by me at the Royal Infirmary on September 26, 1883. A phosphatic stone weighing over 4 oz. was removed by the lateral method. He had profuse secondary hæmorrhage on six occasions, from the 6th to the 25th October. After the

last bleeding, which nearly killed him, the nurse found amongst some clots an organized mass, about the size and shape of a small raspberry, which had esaped through the wound, and which my house-surgeon (Dr. Lowe) and I examined. It was very like a villous growth, but more fleshy, Unfortunately it was accidentally thrown away before it was submitted to microscopic examination. After the escape of this, no recurrence of the bleeding took place, and the patient made a good recovery. I regretted that I had not searched the bladder with my finger after the first bleeding, when I should probably have discovered the cause and removed it.

The next case I shall select illustrates the sudden death from hæmorrhage into the bladder of a patient believed to be suffering from a vesical tumour.

In May, 1883, and some months previously, I saw a gentleman, aged 50, with Dr. Adam: he was suffering from hæmaturia, and the conclusion we arrived at was that the bleeding was caused by a tumour within the bladder. By the use of matico we were able very materially to restrict the amount of blood lost in this way, and at times it almost disappeared from the urine. Still, however, there were continuing symptoms, which could not be explained by any other view than that we took, and the necessity for operative interference was discussed. At 11 p.m. on October 6, 1883, I was hastily summoned by Dr. Adam to meet him. When starting for a long railway journey at five that afternoon, the patient suddenly found himself incapable of passing anything but pure blood by the urethra. He returned to his railway carriage, and there remained in the greatest possible agony during the whole of the five hours journey down. Fortunately a medical man who happened to be travelling in the same train, was able to give him some relief by a hypodermic injection. The agony, however, of a bladder distended with blood clots was most exruciating. When we saw him on his arrival at home that evening, we found him semi-conscious, and making most frightful struggles to empty his bladder by all natural and imaginary devices. His eyeballs were protruded, and his appearance was very distressing to behold. With some difficulty, by reason of his frantic struggles, we placed him under chloroform, and made out that his bladder contained a mass almost as large as his head. Being provided with a gum-elastic catheter eighteen inches

in length, I succeeded in introducing this, and after it had passed through a dense mass of clot some bloody urine escaped, and then we were able to get rid of a certain portion of the fluid blood: still the bladder seemed to fill again just as fast as its contents were withdrawn. I thought I could distinguish with the point of the catheter something like the unevenness of a growth. We also tried to evacuate the bladder by means of Clover's apparatus for stone fragments, and in the use of this we were to a certain extent successful; the blood, however, welled up within the bladder, and there was little else for us to do. The terrible agony the patient had undergone during the railway journey, added to the loss of blood, which was not inconsiderable, caused death at 2 a.m., that is to say, nine hours after the sudden hæmorrhage into the bladder first took place. We very much regretted that the friends would not permit even a partial examination of the body to be made.

This is a case which may be regarded as illustrating probably the most painful aspect of the natural history of some bladder tumours.

There are several points worthy of comment in connection with the hæmorrhage proceeding from these growths and its treatment. Occasion may be taken to notice the uniformity with which persons suffering from bleeding tumours of the bladder—especially malignant ones—speak of the sense of relief they experience when slight hæmorrhage, as indicated by the state of the urine, is continually going on, as compared with the entire cessation of this discharge. I have almost learnt to regard this symptom as pathognomonic.

It has been frequently noticed how long a time clotted blood, in small quantities, will remain in the bladder, provided it is surrounded by certain conditions. I have a patient under observation who is slowly disintegrating a blood clot, which, it is believed, has been lying in his bladder for many weeks since the accidental occurrence of a vesical hæmorrhage, which we have reason for concluding has not since been repeated. It should be stated that the urine has remained acid throughout, and of a somewhat low specific gravity. A blood

clot subjected to the action of alkaline or ammoniacal urine means, as I have said before, bacterial putrefaction of the whole mixture, and the rapid development of acute cystitis, unless steps are promptly taken to empty and cleanse the bladder.

It must not be forgotten that surgery includes other resources than those already referred to, which experience has shown to be of value in connection with the treatment of bleeding from growths of this kind. Of these may be mentioned the hot douche; that is to say, the application, in a continuous current, of water at a temperature of 110–120° Fahr. to the interior of

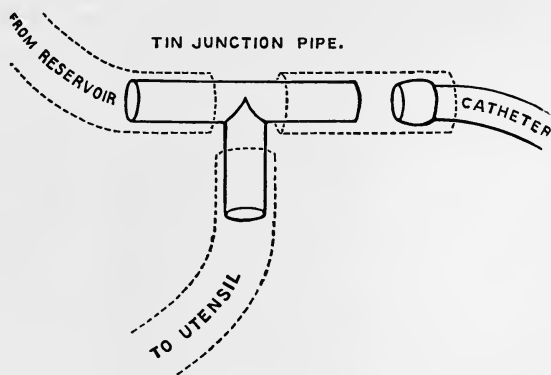


Fig. 40.

the bladder. It is now some years since I advocated this in connection with certain sensitive conditions of the mucous membrane of the bladder after attacks of cystitis. In vascular growths of the bladder the greatest benefit has followed the persistent adoption of this practice. Where the villi are not large, it may be sufficient to effect their removal. I have found the following to be a simple plan of effecting bladder irrigation. The apparatus consists of a rubber catheter, a tin vessel capable of holding a quart of water, and some rubber piping: if the connection between the reservoir and the catheter is made with one of Dr. Solomon Smith's junction pipes\* (Fig. 40) the

\* *The Lancet*, March 22, 1884.

bladder can be as thoroughly irrigated in this way as by a double current catheter. In conducting this operation it is desirable not to use anything harsh or likely to occasion bleeding. The rubber or American silk catheters are admirably adapted for purposes of this kind.

Perplexing instances are occasionally met with where hæmorrhage is maintained by the presence of a stone which cannot be discovered. In a case that was recently attended by Dr. D. Forbes and myself, a young man suffered for some weeks from hæmaturia and cystitis; he was sounded by both of us carefully, but without positively ascertaining that a stone was present. After the last sounding he passed an angular oxalate stone, and all his symptoms at once ceased. The further persistence of hæmorrhage of this kind would have justified the exploration of the bladder by the median method. I believe the stone was held in the orifice of one of the ureters.

## TWENTIETH LECTURE.

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### ENDEMIC HÆMATURIA.

THE *Bilharzia Hæmatobia* was first discovered in the portal vessels of man, in 1851, by Dr. Bilharz, of Cairo, after whom Cobbold subsequently named the parasite. In 1864 Dr. John Harley discovered the ova of the worm in the urine of a patient from the Cape of Good Hope. Subsequent investigations have shown that this parasite has a wide area of distribution in Africa, where it affects men and apes, and, to a less extent, sheep and oxen. The diseases of man dependent on its presence are, a certain proportion of the cases of chronic endemic Egyptian dysentery, the majority of cases of endemic hæmaturia of Egypt, Natal, and the Cape, and also, in all probability the endemic hæmaturia of the Mauritius.

This parasite is a unisexual trematode worm; the male, about half an inch in length and rather flattened, acquires a cylindrical appearance from the thinned lateral margins of the body being infolded ventrally so as to overlap and form a sort of channel (the gynecophoric canal) for the reception of the female during and after copulation. The female is longer and thinner than the male, and quite cylindrical. The eggs are oval, about  $\frac{1}{16}$ th of an inch in length, and pointed at one end, which is armed with a short sharp spine, terminal in position when the ova are lodged in the urinary passages, but lateral when they lie in the mucosa of the bowel (Zancarol). The outer layer of the ovum is a tough hard shell of keratine; inside this the yolk segments and develops into a ciliated embryo, the shell is ruptured, and the now free swimming ciliated trematode probably

passes into the body of some intermediate host belonging to the snail tribe, where it changes into a *cercaria*, to be subsequently again acquired by man through the medium of stagnant drinking water. The cercaria stage and its host are unknown.

In man, the adult male and female worms reside, in a few cases, in the vena cava inferior and its tributaries, but the true home of the parasite is in the portal vein and its numerous tributaries. Kartalis has counted three hundred, mostly in sexual pairs, in the portal system of a single case. The parasites, after impregnation, are to be found in largest numbers in the submucosa of the bladder, ureter, renal pelvis, and rectum. Here, lying in large smooth-walled spaces, which are dilated bloodvessels, the female deposits her eggs, which pass on to the surface of the mucosa, possibly by the boring action of their spines, assisted materially, in the case of the bladder, by the contraction of that viscus. As they become free, the surface of the mucosa is lacerated and blood escapes freely from the torn capillaries and is discharged with the ova and urine. Although empty shells have been found in the left heart, and many ova in the lungs and liver of some cases, by Dr. Mackie, of Alexandria, still the "*Bilharzia infarcta*," of Sonsino, do not appear to be of frequent occurrence; except in the neighbourhood of the parasite, the position of the parents prevents the ova from making their way into the larger veins, and acts as a block to direct them towards the anastomosing capillaries, which, from their size, they cannot pass along.

When *Bilharzia* are lodged in the veins of the urinary apparatus, they produce symptoms varying according to their number and position. In Natal, especially, many boys harbour the parasite without much inconvenience; their general health is usually good; they have occasional attacks of lassitude, with pain in the loins or perinæum, especially after exertion, and they have intermittent hæmaturia, of which, however, they take but little notice, as it usually disappears before puberty. The ova may, as Dr. Harley has pointed out, be still present in the

urine when all other signs of the existence of the parasite have disappeared. In more serious cases, the symptoms are, in addition to those already named, the presence of muco-pus along with the ova and blood in the urine, frequent micturition, vesical tenesmus, and all the signs of chronic cystitis. The blood is usually passed almost pure at the end of micturition, and nearly always contains many ova. *Post mortem*, or after a cystotomy, the mucous membrane is found to be swollen and ecchymosed in patches, usually on the posterior wall of the bladder, or showing here and there elevated thickenings, covered with a gritty material composed partly of urates, or uric acid,

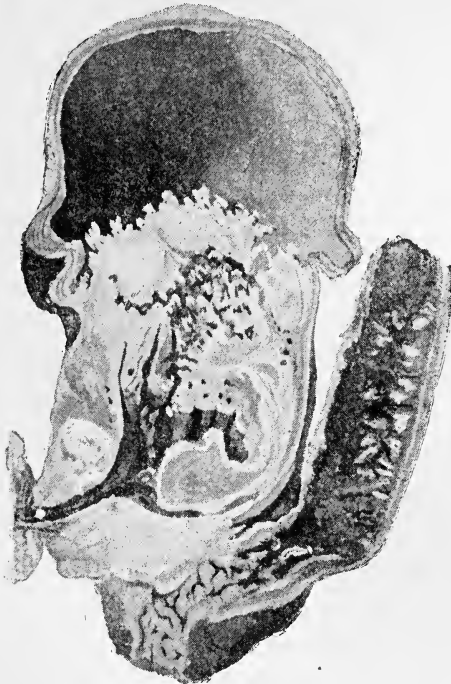


Fig. 41.

and partly of ova. In the interior of the thickenings are many yellowish white specks, made up entirely of ova, lying in dilated

vascular spaces. In other cases, where death has resulted from exhaustion or the supervention of typhoid symptoms, the bladder is small and contracted, its muscular wall greatly thickened, and the mucosa and submucosa involved in large irregular elevated lumps, with shreddy surfaces, lying mainly at the base and around the urethral orifice, and constituting a veritable tumour of the bladder (Fig. 41).

This drawing is from a specimen recently sent me by Dr. Mackie, which, with others of the kind, has been carefully examined by Dr. Barron and myself. It represents a section of the bladder, prostate, urethra, and rectum. It will be seen that the upper part of the bladder is normal, whilst the lower is filled with excrescences due to the presence of the parasite. These fungating looking masses contain large and small chains and nests of ova, running in all directions, and here and there abutting on the surface.

It would appear (Bilharz and Meckel) that sixty-three per cent. of the Egyptian fellaheen are infested with *Bilharzia*.

A case which is at present in the Royal Infirmary under the care of Dr. Davidson, and which seemed at first sight to be one of intermittent hæmoglobinuria has, on further investigation, disclosed the occasional presence in the blood-stained urine of ova closely resembling, if not identical with, those of *Bilharzia*. The patient, a man aged about forty, is a native of the Scottish highlands, and has never been out of this country.

When the vessels of the ureter or renal pelvis are the habitat of the parasite, the results are usually more rapidly fatal from the production of hydronephrosis, of pyelonephritis, or of acute suppuration of the kidneys. Obstruction of the vesical orifice of one or both ureters occasionally takes place from their involvement in the bladder tumours, and hydronephrosis or pyelonephritis may result.

Males are much more liable to the disease than females. Provided the patient can be kept alive and free from reinfection, the disease must evidently have a self-limited duration, depen-

dent on the natural period of life of the parasite. This is not yet very definitely ascertained, but appears to vary from one or two to ten years.

It is to be noted that the eggs of *Bilharzia* often form the nuclei of uric acid calculi, which may not give rise to symptoms of their presence for some years after all indications of the parasitic disease have disappeared.\*

As bearing upon the clinical features and surgical treatment of this disease, I will quote the following remarks by Dr. Mackie relative to a specimen he has been good enough to forward me, and which was recently shown for me at the Pathological Society of London by Mr. Butlin.† It is now preserved in the Museum of St. Bartholomew's Hospital.

Specimen of diseased bladder, kidneys, rectum and dilated and thickened ureters from a fatal case of severe hæmaturia from *Bilharzia hæmatobia*. The old man came under my care suffering from dreadful continued pain, and passing almost pure blood mixed with enormous quantities of debris containing ova of *bilharzia*. To ease the pain and examine his bladder, to see if the surface could be scraped or any tumour removed, Dr. Mackie performed perineal urethrotomy. The bladder was found to be studded full of papillomatous-feeling tumours, bleeding freely. It was no use trying to remove any as they were in dozens. So nothing further was done. The pain was eased, the hæmaturia diminished, but he died of uræmia a week or two afterwards. *Post mortem* examination showed that the walls of the bladder were full of small tumours filled with ova.

To another specimen of the same kind of disease, Dr. Mackie refers in the following words:—

\* References to the literature of this subject:—

Bilharz.—*Zeitschrift für Wissensch. Zool.*, 1851.

Griesinger.—*Archiv. der Heilkunde*, 1854.

Cobbold, T. S.—*Parasites of Man and Animals*, 1879, p. 38.

Mackie.—*Brit. Med. Journal*, Oct. 7, 1882.

Harley, J.—*Med. Chir. Trans.*, vols. 47, 52, 54.

Sonsino, P.—*Archiv. Gen. de Medicine* for June, 1876, p. 650.

Zancarol.—*Path. Trans.*, xxxiii.

Wortabet, J.—*Edin. Med. Journal*, 1879-80.

Roberts, Sir W.—*Urinary Diseases*, 3rd Ed.

† *Trans. Pathological Society of London*, 1887.

This specimen is from a man who came to hospital for hæmaturia, passing blood and debris, with pus and mucus, suffering agony. I performed perinæal urethrotomy, and drained the bladder, which, as usual, stopped the hæmorrhage; but he died in about a fortnight after of rupture of the bladder from destruction of the walls by ulceration caused by the bilharzia. Dr. Mackie goes on to remark: "For some years I have been directing my attention to this disease in connection with urinary fistula, which is nearly as common as hæmaturia, and which I have proved to my satisfaction is caused by the same parasite, as in *every case* I find the ova in hundreds in the hard tissue around the fistulous tracks in the perinæum. In every case there is hæmaturia with ova in the bladder, with a history of sudden phlegmon and perinæal abscess, with no history of injury, or stricture, or gonorrhœa, or anything urethral to account for it. For a long time these cases of perinæal urinary fistulæ puzzled me; men came in with their perinæums a large fibrous mass, riddled with sinuses and fistulæ, through which the urine passed on micturition; but no stricture, their urethra admitting easily the largest catheter, or, as often remarked to strangers, I believe their urethra would take in my little finger, and no history of previous stricture."

Various suggestions have been made relative to treatment, their object being to effect the destruction of the parasite in the blood. Harley recommends the administration of the oil of turpentine and of the male fern, with a little chloroform, in order to expel the ova from the urinary passages, and a solution of bicarbonate of potassa to relieve renal irritation.

Though I have had no personal experience in the treatment of this affection, I should feel very much disposed to try, where the bladder was involved, the use of corrosive sublimate as a wash (1-10,000); its great use as a bactericide would seem to hold out some hope that it might be serviceable in the destruction of this parasite. Where perinæal section is employed, as illustrated in the cases referred to, for the purpose of cleaning the bladder of the excrescences formed within its interior by these parasites and their ova, its subsequent irrigation with a suitable solution of corrosive sublimate seems to me to be worthy of trial.

Though chiefly affecting the urinary apparatus, this disease is not limited to it, but frequently involves the intestinal canal, producing symptoms simulating dysentery and disease of the lower bowel. Amongst the specimens forwarded to me for examination is a polypoid parasitical excrescence removed from the bowel, in reference to which Dr. Mackie states : " This is a tumour removed by the *écraseur* from about four inches up the rectum of a man who came to me complaining of dysentery and prolapse of the bowel ; he is now about, the dysentery and prolapse having disappeared since the operation. This man had also ova in his urine, but passed only a drop of blood at the end of micturition."

When we consider the serious injury which is done to native populations by this disease, in addition to the risk that is incurred by troops and others visiting these districts, of contracting it, the importance of a more thorough knowledge of it, in relation to its prevention and treatment must be at once admitted.

## TWENTY-FIRST LECTURE.

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### URINARY TUBERCULOSIS.

To attempt to give a complete account of urinary tuberculosis, or phthisis, would resolve itself into an endeavour to anticipate much that still requires investigation; considerable progress has, however, been made during the last few years in the study of this affection, and, consequently, the task is lighter of arranging the knowledge we possess for present clinical requirements.

In studying tubercular disease as it affects the urinary organs in both sexes, either by the bedside or in the *post-mortem* room, we cannot fail to be struck with the marvellous sympathy which exists between all those parts of the apparatus which we have been taught to regard as distinct. This sympathy is seen in various ways, partly in relation to the distribution of the disease, but more particularly in the remarkable effects produced in distant parts during its development and progress. Why, for example, frequent micturition should occur in connection with tuberculosis of the kidney is at first sight difficult to comprehend.

It is useless for my purpose to consider the subject of urinary tubercle in that fragmentary manner which is implied on looking at it in association with the parts which together make up the genito-urinary apparatus. We must, therefore, in the first instance, regard it in relation to the whole system, and reserve for future comments its manifestation and treatment as affecting in their order the different parts when they come to be individually considered. Tubercular disease of the genito-urinary organs—for these two systems cannot here be dis-

sociated—has much in common with what is observed when it attacks other parts of the body.

In the first place it is distinctly hereditary, not that this necessarily implies that a patient's predecessors suffered from tubercle of this system, but only that his immediate ancestors may be proved to have developed some form of tubercular disease. How often we find young males showing signs of urinary tuberculosis whose parents died from pulmonary consumption. The family history of the patient is an important investigation, especially in connection with obscure disorders of the genito-urinary tract.

In the next place, the disease corresponds in its most usual occurrence with that period of life when the development and use of the sexual organs are commencing and continuing to be the most active; it is essentially a disease of adolescence and of vigorous, though not necessarily robust, manhood. It is comparatively rare in women. When tubercle attacks females the most frequent seat is the lungs. Why the sexual apparatus of females should enjoy this comparative immunity is not at first sight so apparent; that it does, there can be no doubt. It may be, and certainly is to some extent, due to the fact that females are less exposed than males to what I would speak of as the excitants, or perhaps more correctly, the localisers, of this disorder. In tubercular subjects, protracted gonorrhœa and its complications, more frequently than all the other causes put together, determines the deposit to some part of the urinary tract, from which it slowly spreads to other parts of the system. A chronic orchitis is a constant precursor of urinary phthisis. Women, though they suffer from gonorrhœa, do not do so in the same way or to the same degree, nor are their complications of the disorder so protracted or severe. Further, they are more readily cured. Tubercle may invade the urinary organs either from the kidneys downwards, or the testes upwards; these are the more usual modes of accession. In the female, a labial abscess is often the initial

lesion, as inflammatory deposit in the testes may be in the male.

It will not be necessary for clinical purposes to occupy much time with a description of the mode in which tubercle invades the normal tissues, its varieties, or its chemistry; information of this kind will best be obtained from the more recent works on pathology. In the form of grey miliary granulations, or as yellow caseous masses of various sizes, tubercle may be met with indiscriminately in any part of the genito-urinary apparatus: it is found in the kidney, the ureter, the bladder, the prostate, the vesicula seminalis, the testes, the epididymis, and the urethra; wherever implanted there is no knowing where it will spread to. It will be seen that the tendency to spread is an important feature in relation to points connected with diagnosis and treatment.

Urinary tuberculosis, when the deposit is in relation with the mucous tract from the kidney downwards, is pretty sure to be associated with one or other of three symptoms, though as a rule, they are all present in varying degree. These prominent symptoms are hæmaturia, frequent micturition, and excess of, or change in, the urinary mucus.

Hæmaturia stands in relation to this phase of the disorder as hæmoptysis does to pulmonary phthisis: it is frequently an early symptom, though the amount of blood lost in this way is generally small. The profuse hæmaturia of urinary tuberculosis is usually associated with its later stages of ulceration. I have seen a considerable amount of blood lost from those excavating ulcers of the bladder which are common in the course of this disorder. Then there is frequency of micturition, which, as a rule, when the kidneys only are involved, is not explainable by anything that the surgeon can detect; and, lastly, there is a considerable excess in the urinary mucous. These are symptoms which, when they continue and are otherwise unaccounted for are very significant. When the disease has made more advance, either in the kidney, bladder, or prostate, the urine becomes

charged with pus and other signs of disintegrating tissue. It is curious to notice how, even under these circumstances, the urine retains an acid re-action; it is not until it undergoes decomposition, by the retention within it of pus and unhealthy lymph, that it becomes offensive and ammoniacal. A person who is infected primarily with urinary tuberculosis not unfrequently develops symptoms of a subacute form of peritonitis, which shows that the disease has invaded by contiguity more or less of the intestinal tract. In this way I have on several occasions seen the disease brought to a termination with a swollen, tender, and tympanitic abdomen.

Tubercle of the kidney in its earliest form I have frequently found to be a cause of incontinence and urinary irritability in children. Many children, especially males, who were suspected of stone, proved to have tubercular kidneys. In one instance that recently came under my observation, the prepuce of a child had been removed with the hope that this might relieve the urinary irritability; extensive renal tuberculosis, with almost entire atrophy of one kidney, was shown after death to have been present.

The following case illustrates some features to which reference has just been made:—

E.S., aged eleven, a schoolboy, was admitted into the Royal Infirmary on June 19th, 1882. About eight weeks before admission the patient after micturition passed some pus, which he described as being in little nodules. The symptom continued occasionally for twelve days. This was followed by the discharge of minute clots of blood at intervals after micturition. On admission, in addition to this history, he complained of micturating frequently with pain referred to the penis and neck of the bladder. He was a fair delicate-looking boy, and for twelve months had often complained of headache. The urine was normal in appearance; sp. gr. 1010, acid; contained mucus and a trace of albumen. June 20th: Mr. Harrison introduced a sound under ether, but no stone could be detected. Volkmann's bimanual method of examining the bladder was then employed, when a nodule at the fundus was distinctly felt. In the

evening the temperature rose to 102°, falling in the morning to 97°. The patient was placed on a milk diet, and kept in bed. The evening rise in temperature continued.—24th: It was noted that he was slightly delirious during the night. Cold applications to the head were employed.—26th: Had a very restless night. In the morning he passed into a semi-conscious state, with strabismus and other symptoms of acute tubercular meningitis.—On the 27th he remained in much the same state of semi-unconsciousness. Some urine that he passed was found to be of sp. gr. 1020, acid, one-sixth albuminous, tubercle bacilli were discovered by the microscope.—30th: Died, having been quite unconscious for some hours. *Necropsy*.—Lungs contained recent miliary tubercles. Liver was normal in size, also containing tubercles. The right kidney was healthy, ureter dilated; the left was enlarged, and, on section, the pelvis and calyces were dilated, and contained a yellow exudation membrane. This yellow, almost puriform, membrane extended along the whole length of the dilated left ureter to the bladder. There were tubercles in the substance of the kidneys, and some of the pyramids were partly absorbed. Bladder: The mucous membrane was covered with a multitude of minute superficial ulcerations of a tuberculous kind; the mucous membrane of the trigone was roughened; at the fundus a caseous tubercular nodule was found which had been felt during life. Brain: convolutions flattened, lymph at base, ventricles very much dilated; recent miliary tubercles were found in both Sylvian fissures.

In the case just recorded, the detection of tubercle bacilli in the urine assisted the diagnosis. In helping to make a diagnosis in doubtful cases, I have sometimes found the thermometer to be of much assistance: if there is urinary tuberculosis, the temperature, with other symptoms, seldom fails to give us a good hint. Of the various operations employed for the relief of urinary affections I do not know one that has given more relief than cystotomy; the least favourable cases in my experience have been those where it has been undertaken on conditions arising out of urinary tuberculosis. When undertaken solely for the purpose of relieving the intense reflex irritation—the frequent micturition—which often attends

the early deposit of tubercle in the urinary apparatus from the kidneys downwards, it is generally a failure. When, however, it is resorted to merely for the purpose of giving exit to the products of tubercular suppuration, to pus, lymph flakes, and offensive putrifying urine, then, on physical grounds, it may prove of some service. I have known, in cases of urinary tuberculosis, the desire to micturate quite as distressing to the patient though urine was flowing continuously and incontinently by a perinæal drain. For the same reason, over-dilatation of the female urethra, for the purpose of producing temporary incontinence, does not relieve the reflected irritability of urinary phthisis. The following case illustrates some of the points I have referred to:—

Some years ago, a little boy, four years of age, came under my care at the Royal Infirmary, at the request of Dr. Little, of Everton, on the suspicion that he had a stone concealed somewhere in the urinary organs. He had many symptoms of this complaint, but, though he had been sounded several times, no calculus could be felt. He was the child of strumous parents, and was singularly bright and intelligent for his age. Twelve months previously he commenced to wet his bed at night, and to suffer from urinary irritability in the daytime. Occasionally very small quantities of blood had been detected with the microscope in the urine, which was invariably acid and opaque. Within two months prior to his admission, the urine had been charged with mucus granular matter and a little pus, the expulsion of which from his bladder causing much spasm and suffering. To aid micturition, and to mitigate the spasm, he acquired the habit, which at last became constant, of pulling at his penis. He seemed, as it were, to milk away the urine and what it contained from his bladder. It was under these circumstances he came into the Infirmary, when it was found necessary to give him sedatives freely. The urine, always granular-looking and opaque, now and then contained something which looked more like the white of an egg half boiled than anything else. He was sounded under ether, but nothing abnormal could be detected. Towards evening he generally had a rise of temperature, and there was a tendency towards hectic. To alleviate the constant pain and spasm of micturition, a median cystotomy for drainage was performed, but with little benefit. The spasm and vesical tenesmus

continued unabated. In the course of a month the child died with renal symptoms and a gradual suppression of urine. *Post-mortem* examination showed nothing wrong with the bladder or urethra. The ureters were dilated, and the kidneys cystic and tubercular. Some of the cysts thus formed, communicating with the pelvis of the kidney, contained thick gummy-looking mucus, similar to that which was observed in a more diluted form in the urine; the cyst-walls seemed to be engaged in secreting this viscid matter, which, obviously, with some difficulty had found its way along with the urine down the ureters. This was the explanation of the dilated ureters, the bladder-spasms, and irritability, which led to cystotomy being practised. Without such an explanation it was difficult to understand how the ureters could be dilated and yet no stricture exist in the urethra.

This case makes prominent the following points: (1), that urinary incontinence or irritability in children may proceed from renal tuberculosis; (2), that though cystotomy may relieve the pain and spasm attendant upon the expulsion of the unhealthy urine from the bladder, it does not relieve the symptoms, which are due to the same urine passing down the ureters. In some cases of this kind, there might be reasons for opening and draining the cystic kidneys, with the view of preserving what remains sound in structure, as well as of preventing the constant spasm or colic which is aroused by the products of the disorganized kidney forcing a way along the ureters; (3), that such a case serves to illustrate those extremely rare instances (of which but few specimens are known to exist) where stones in the bladder have been found wrapped up, as it were, in fibrous or gelatinous envelopes. It was only recently when I had, by the kindness of Mr. Bickersteth, an opportunity of carefully examining and preserving a well marked specimen of what these tubercular cysts in the kidney are capable of pouring along the ureters into the bladder, that I saw the explanation of these semi-fibrous stones. This subject will again be discussed and fully illustrated in connection with the sounding of the bladder for stone.

The possibility that in a tubercular subject a small stone in

the bladder may be wrapped up by a sort of fibrous investment, furnished by a cystic kidney, must not be lost sight of in the investigation of obscure cases of vesical stone; whether or not, the explanation I have offered as to their formation is a satisfactory one.

In the diagnosis of urinary tuberculosis in the male, the careful examination of the testes and prostate with the finger often furnishes valuable evidence as to the probability of tubercle existing in some other portion of the genito-urinary apparatus, which is beyond reach of manipulation. When deposit in these parts exists with signs of functional irritation in some form or other in the urinary apparatus generally, the suspicion that tuberculosis exists is exceedingly strong, particularly if the patients are adolescent males and the family history pointed to a strumous diathesis. The following case I saw, in consultation with Dr. Glynn, in the Royal Infirmary, illustrates the importance of a physical examination in cases of this kind:—

The patient was a youth, aged 19, who was admitted in February, 1884, into Dr. Glynn's wards. *History.*—A strong family history of consumption. Patient had good health up to two years before admission, he then began to fail generally. For twelve months he had been suffering from a short dry cough, and pain in the region of the kidneys had been present for three months. On admission he was much emaciated. There was pain on pressure in the left lumbar region and much tenderness over the liver. Urine was passed twelve to fourteen times daily with smarting pain over the pubes both before and after urination; it contained much pus, but no bacteria were found. The prostate was examined by Mr. Harrison, who found it made up of round nodulated masses. In one testis there was some deposit in the globus minor. These symptoms continued until death took place, on March 8. Autopsy, seventy-two hours after death. The whole of both lungs were studded with miliary tubercles, many of which were commencing to caseate, but the caseation in no instance was advanced. The abdomen was much retracted, the peritoneum normal. In the transverse and descending colon there were two large typical tubercular ulcers, about twelve inches apart. The

right adrenal was small and soft, containing a mass of yellow tubercle. The left adrenal was full of caseous material and calcareous matter. The kidneys were large, the tissue of each was almost destroyed, its place being occupied by large and small caseous nodules and cavities. The renal tissue remaining was studded with tubercle. The ureters were dilated. The bladder was small and hypertrophied, and contained pus and urine. The mucous membrane was studded with tubercular ulcers. Leading into the bladder was an opening into the prostate, which was softened and riddled with cavities full of caseating matter. The mucous lining of the urethra was discoloured. The globus minor of the right testis contained a caseous mass the size of a large pea, the body of the testis was hard and fibrous—the specimen was shown at the Medical Society by Dr. Rich.\*

It will not be necessary to multiply examples, as I think these will be sufficient to bring into prominence the points to which the surgeon has more particularly to direct his attention.

There are a few remarks which may be made in reference to the treatment of a tubercular condition of a system of organs which is far more common than we are at first sight inclined to believe. In the early stage of the disease the patient requires almost the same attention as in pulmonary phthisis, so far as climate, diet, clothing, and medicines are concerned. A sea voyage is often of great service in these cases, when the state of the urine and the act of micturition does not render this out of the question.

I have already stated that cystotomy is not to be recommended in this class of cases unless the urine becomes so disordered and the bladder so irritable as to seriously add to the distress of the patient in voiding it. For the irritability of the bladder I would recommend the use of morphia, either by the mouth or in suppositories, and anodynes in preference, as a rule, to operative procedures. The quantity of morphia required in certain cases of urinary tuberculosis is sometimes very great.

In October, 1883, I saw, with Dr. Paton of Rock Ferry, a patient

\* *Liverpool Medical and Chirurgical Journal*, January, 1885, p. 219.

(A.W., aged 17) who was subsequently admitted into the Royal Infirmary. I was doubtful at first whether he was suffering from extensive tuberculosis of the prostate and bladder, or malignant disease. Sounding was most exquisitely painful. In January, 1884, in consequence of pain, hæmaturia, and the state of the urine, I performed cystotomy. This relieved some of the symptoms, but not the irritability. For the latter, morphia was prescribed. Under this treatment, with cod liver oil and tonics, he steadily improved and left the infirmary. In October, 1886, he reported himself as perfectly well, so far as the urinary symptoms were concerned. He has the appearance of being in good health, and goes about his business as a collector. The quantity of morphia he now takes is from twelve to seventeen grains daily. He cannot give up the habit, though he is desirous of it, in consequence of the lassitude and pain in the head that follows its withdrawal. I should add that this patient's testes became markedly tubercular.

The value of morphia and opium in the treatment of urinary tuberculosis is very great, but I have often found it necessary to use far larger doses than are usually prescribed. When the urine is very offensive, the bladder may be washed out with some antiseptic fluid, but if this occasions hæmorrhage from the tubercular mucous spots, it had better be dispensed with.

Much stress has been laid on the infection of tubercle, and the necessity of early removing the primary deposits when they can be readily got at. In reference to this point, Dr. F. W. Rockwell,\* of Brooklyn, remarks: "I believe the treatment of tuberculous testicle should be that of strumous disease of any other gland, and that early removal, either of the caseous masses or of the whole diseased organ, should be more generally practised than at present." The indications calling for the adoption of this principle will best be considered in connection with the diseases of the separate parts to which it relates.

There is a remote effect of tuberculosis to which I would

\* "Tuberculosis of the Genito-Urinary Tract," *New York Medical Journal*, January 10, 1885.

just refer. We occasionally meet with cases where tubercles have become cured by cretification. I have known such deposits in the bladder and prostate cause frequent micturition, and give rise to a suspicion that the person is suffering from stone. The history of the case, and the observation that these calcareous spots are fixed and not movable when felt with a metal sound, usually enables the practitioner to diagnose them without difficulty.

## TWENTY-SECOND LECTURE.

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### PROSTATITIS—ABSCESS—GOUTY PROSTATITIS.

OF all the complex structures from the kidneys downwards, which together constitute the genito-urinary tract, the prostate may be regarded as the least liable to attacks of acute inflammation, and in this respect it seems to serve a wise purpose in acting as a check against the extension of inflammation from the much exposed and susceptible urethra below it to the more vital organs above it. Structural differences of this kind play a most important, though not, I believe, a sufficiently appreciated part, in limiting the progress of a variety of pathological actions, which otherwise, by continuity, would spread almost unrestrained.

Under the term acute prostatitis, I have been in the habit of recognising two varieties, presenting distinct pathological features, each disposed to pursue a tolerably definite course, and determined by different circumstances. The one I shall speak of as acute follicular prostatitis, the other as acute general or parenchymatous prostatitis. I think that these terms will not only be found convenient in localising the effects of inflammation as observed in the part, but are also free from anything like an artificial distinction.

A very brief reference to the structure of the prostate will suffice for my purpose. It is essentially follicular and muscular, the former consisting of numerous openings into elongated canals, which join to form from twelve to twenty small excretory ducts. The secreting element is, so to speak, embedded in muscular fibres of the involuntary kind, the whole being

enclosed in a thin, but firm, fibrous capsule distinct from the posterior layer of the deep perineal or triangular ligament. I think it will be at once conceded that in the prostate we have two elementary structures—one, the follicular, which is not at all opposed to inflammatory attacks; and the other, the muscular, which only becomes inflamed when the provocation is extreme. Further, as being explanatory of some of the symptoms which are met with in the course of a prostatitis, we must not forget the unyielding nature of the covering with which the part is invested.

Acute follicular prostatitis is not by any means a very uncommon event. It is most frequently seen in connection with gonorrhœa. A person with this affection suddenly finds the discharge either diminished or altered in character, and this is immediately followed by a sensation of weight or uneasiness in the perinæum. The prostate is found to be hot, tender, or swollen; micturition becomes frequent or impeded in accordance with the extent to which the bladder structurally sympathises, or the swollen prostate obstructs. In some cases there is complete retention. In such instances as these, it will be found that the inflammation is almost entirely confined to the follicles of the part. These may individually suppurate, or a limited abscess may form by the fusion of two or more of them which have thus become obstructed. "There is never, then," as Bumstead\* remarks, "at the outset one abscess of considerable size. Such occurs only by the coalescence of a number of small ones seated in the follicles. Meanwhile, the muscular tissue, which constitutes so large a portion of the prostate, is unaffected, except that it is in a constant state of contraction, thereby inducing urethral and rectal tenesmus."

And what is true of the normal prostate, in regard to the insusceptibility of its muscular portion to inflammatory action, is still more apparently so when it is hypertrophied and the

\* *The Pathology and Treatment of Venereal Disease*, Bumstead and Taylor; 5th edition, New York.

proportion of muscular and connective structure is increased. And if proof of this were required I would point to the tolerably hard usage the part sometimes receives, when in the course of its growth it impedes micturition and becomes an obstacle to the introduction of the catheter. Though nearly every museum furnishes instances where, either by accident or design, the outgrowth has been more or less riddled with perforations, or shows other signs of hard, though possibly necessary, treatment, yet examples of suppuration or inflammation occurring under these circumstances are comparatively rare. The impunity with which forced catheterism in enlarged prostate has been practised by some practitioners is, I believe, the only excuse for its recognition by writers on this subject.

The follicular, then, is the simplest form of acute prostatitis. Though painful and distressing whilst it lasts the symptoms are not usually protracted, and the prognosis is favourable. Recovery most frequently follows by resolution, suppuration being the exception and not the rule. And when suppuration does take place under these circumstances, it is to be inferred rather than demonstrated, for rigors are often absent, and most careful examination with the finger in the rectum fails to discover fluctuation, though an escape of matter by the urethra may almost immediately follow the introduction of the catheter, which has been found necessary either for the purpose of completing the examination or relieving the retention. And where there has been reason for believing that matter has so formed, I have never known any evil effect result.

The other form of prostatitis, acute parenchymatous or general, is a much more serious condition. It is as if the whole part within the capsule were at one and the same time invaded with the inflammatory action. Suppuration usually rapidly supervenes, and unless treatment is prompt and decisive on the first appearance of fluctuation as revealed by rectal examination, the most serious results, both to structure and life, are likely to follow. The morbid process closely resembles what, in other

parts of the body, we are accustomed to speak of as acute phlegmonous inflammation.

This form of prostatitis is rare. I can find no specimen of the kind described in the *Transactions of the Pathological Society* since 1865, nor do I see any reference to it amongst the *Proceedings of the Clinical Society* from its commencement. I have looked through a considerable number of the volumes of hospital reports published by several institutions, all of which show how seldom this affection is met with. Instances of it will, however, be found scattered throughout the medical journals; and the experience of those who have seen much of this class of disorders will include some examples. Here, owing to the violence of the inflammation, the structures outside the prostatic capsule become more or less infiltrated with serous effusion, or even pus—a condition which has been described as peri-prostatitis. This I have never seen to any appreciable extent, except as secondary to acute suppurative inflammation of the whole part, and I believe that it has no other significance.

At the outset it is not easy to determine which of the two conditions I have referred to we have to deal with. The causes producing them are much the same, and we must look for other circumstances as determining whether the inflammation will be limited to the follicles or will involve *en masse* the entire part. And we shall find that the very circumstances which lead to the latter are such as, if they happened to be present when any part other than the prostate was inflamed, would render the occurrence of suppuration, if not of gangrene, probable.

We have only to look at the kind of persons who suffer from acute parenchymatous prostatitis to learn the circumstances favouring it. Speaking generally, they may be indicated as individuals of either much deteriorated constitutional powers, or as possessing urinary organs more or less damaged by long-standing obstructive disease. Belonging to the former class, we see it occasionally happening in persons whom we are accus-

tomed to speak of as highly tubercular, and who have been unfortunate enough to contract a gonorrhœa. I have seen it occur in such subjects, and have had reason to suspect (though I have never been able to prove it) that a previous state of tuberculosis had determined this particular consequence. Here it is not the follicles that alone suffer, but the whole part, the capsule of which serves the purpose of a bag for the pus which is the result. Again, it is seen in prostates that have been rendered unhealthy by old-standing strictures and cystitis. In these, on the occurrence of some fresh exciting cause, such as the gonorrhœal poison, or even, I believe, by disordered urine, the part seems to have lost its power of resisting inflammation, and may speedily suppurate. Under these circumstances the occurrence of suppuration must be carefully looked for, as the spontaneous escape of matter in such directions as the rectum, bladder, and peritonæal cavity, is likely to be much more detrimental than the opening which the surgeon would afford.

Gangrene of the prostate as a result of inflammation is exceedingly rare, but I believe it occasionally happens. I have certainly seen it after lithotomy in a very unhealthy adult, and I thought that the softened and putrescent condition in which I once found the prostate of a young man who died after symptoms of prostatitis, with other renal complications, was no other than an example of this termination of inflammation. With this brief reference to the circumstances under which we see acute prostatitis, let me refer to two conditions which simulate it, one of which, I believe, has led to the impression that this disease is far more common than it really is.

The first is inflammation and suppuration around the membranous portion of the urethra, as a consequence of urethritis; and the second, inflammation and plugging of the veins constituting the prostatic plexus. I have seen many instances of the former where inflammation and suppuration around the membranous urethra have led practitioners into the belief that

the case was one of metastasis of the gonorrhœal inflammation from the urethra to the prostate. And the points of resemblance are by no means isolated—there is, in fact, a remarkable likeness between the two conditions. In both there is a cessation or an alteration in the character of the urethral discharge; in both there is a feeling of weight and uneasiness about the perinæum; in both there is some difficulty in micturition, perhaps amounting to retention; and in both there is some tumefaction to be felt, and much distress is occasioned on introducing the finger into the rectum. So painful is the latter to the patient that it often leads to an imperfect examination being made, and hence an error in diagnosis arises in exactly fixing the position of the tumefaction, which might have been avoided.

It must, on the other hand, be remembered that in inflammation and suppuration around the membranous urethra, though this part lies between the layers of the perinæal fascia, there is more or less perinæal tumefaction, and that matter so formed may make its way forward and be discharged by means of a perinæal opening. In the cases of acute prostatitis I have seen, neither of these two indications has been present, whilst in urethritis I have usually observed them. Considering the relations of the prostate and the denseness of the fascia immediately in front of it, I do not see how perinæal tumefaction is to be expected as a consequence of prostatitis, any more than swelling in this locality is to be associated with the hypertrophy of the gland as it is seen in old age.

I should not have thought it necessary, even to this extent, to have referred to this particular source of error, without knowing, of my own verified experience, of the necessity for it, and without feeling that even in some of our best literature there is ambiguity upon this point. Though I would speak with the greatest possible deference of the writings of the late eminent surgeon Sir Benjamin Brodie, the description he gives in his opening remarks on inflammation of the prostate are, to my

mind, much more applicable to the condition I have been referring to, rather than to the one it is intended to depict. And what Sir Benjamin wrote, many others have copied, and hence the obscurity to which I have referred.

The other disordered condition which may simulate prostatitis is rare, and it is also curious. I have only seen two cases of it, and they both came under my notice recently, about the same time. The primary lesion was rapid œdema of the prepuce, dependent upon plugging of the dorsal vein of the penis. This was quite obvious. In the course of a few days each complained of perinæal weight, frequent rather than painful micturition, with great uneasiness referred to the neck of the bladder, which led to its being suggested that in each case the prostate was inflamed. Both patients were gouty; in one the œdema was attributed to gonorrhœa, in the other to a strong injection. In each I was able to determine, by rectal examination, that the vesical pain and irritability were not due to any inflammation of the prostate, but to the extension of the vein-blocking to the prostatic plexus. Each patient certainly had some ground for believing that prostatitis was imminent.

And now I will say a few words about treatment. I know of nothing which at the outset of an attack of prostatitis gives greater relief than free leeching of the perinæum, followed by hot applications. Some practitioners, I know, advise the use of ice by the rectum, but, as a rule, I have found heat preferable to cold. I am opposed to the employment of all purgatives in this affection. When we consider how closely related the levator ani muscle is to the prostate—how every movement of it necessarily aggravates the sufferings of the patient—I am at a loss to understand how such measures can be advised by anyone who appreciates the good work of the late John Hilton in reference to the importance of rest in the treatment of an inflammation. I should just as soon think of advising a patient with an acutely inflamed knee-joint to walk a mile as I should of administering purgatives to one with a

prostatitis. If a distended rectum requires relief, a copious enema of hot water will answer every purpose, and, in addition, will be found most soothing. Guthrie, in his admirable lectures, refers to the great benefit attending the use of hot enemata in these cases. In one instance of threatened suppuration of the prostate, under my observation, the patient experienced great relief from frequently injecting hot water into the bladder by means of a syringe, (Fig. 2) which I have found serviceable in certain affections of the urethra; and this experience corresponds with a remark of Guthrie's to the same purport. I believe such injections tend to prevent the accumulation of mucus within the prostatic urethra, and in this way avert the formation and collection of matter in the follicles. The use of opium in some form or other will be found essential in protecting the powers of the patient from being worn down by the irritation and pain which to some degree are always present.

As the commoner form of prostatitis is usually seen as a complication arising out of gonorrhœa a word or two may be said in reference to the propriety of any specific treatment under these circumstances. As a rule, when there is much constitutional disturbance, drugs of this kind are not borne; when the fever subsides they do good, whether suppuration or not has taken place in the follicles. A few capsules of sandal wood oil daily, or a little copaiba, will, as a rule, be found of service. There is an old confection which I frequently employ for this and like purposes, and which can be recommended:—

R Pulv. Cubebæ Rec., ʒij.

Bals. Copaibæ, ʒiv.

Ext. Hyoscyam.

Gum. Camphor, ā ā gr. xxx.

Theriaca, q. s.

M. Fiat Confect.—A piece as big as a cobnut, to be taken in rice paper three times a day.—The henbane and camphor combined with the specifics seem to relieve the prostatic spasm

and irritability, which is often a prominent feature in these cases.

The occurrence of suppuration must be carefully looked for ; and it appears to me, in reference to this point, that a conclusion may be formulated to the effect that any formation of matter in the gland which is not appreciable to the finger in the rectum may with safety be left to evacuate spontaneously, but that when fluctuation is detected by rectal examination, a perinæal incision becomes imperative.

Where the abscess points to the prostatic urethra it will generally discharge itself spontaneously, and in this way give sudden relief ; similarly, the passage of a catheter for the retention which sometimes occurs, effects the same purpose. In urgent cases, where it is believed that matter has been formed but is not evacuated, I have practised the following manipulation for the purpose of bursting the abscess, with immediate relief :—The patient being placed under an anæsthetic, a sound is introduced and reversed, the left index finger is then introduced into the rectum, when the prostate is compressed between the two, as is shown in the plate (Fig. 42) :—

After these abscesses have been evacuated, either spontaneously or artificially, into the prostatic urethra as I have described, it will be necessary to see that they do not close up until they are soundly healed. Like quinsys, they usually close with great rapidity ; on the other hand, they sometimes refill, and troublesome internal sinuses remain. Where there is any suspicion of this, the bladder should be washed out daily with warm water until all signs of pus have disappeared from the urine. In tubercular subjects there is sometimes considerable trouble under these circumstances in bringing about sound repair. When the whole prostate is involved in an abscess which is readily detectable from the rectum, the best practice is to make a median incision into it from the perinæum, this is the only way of providing free drainage by a dependent opening. When, however, the abscess is follicular, and is evidently point-

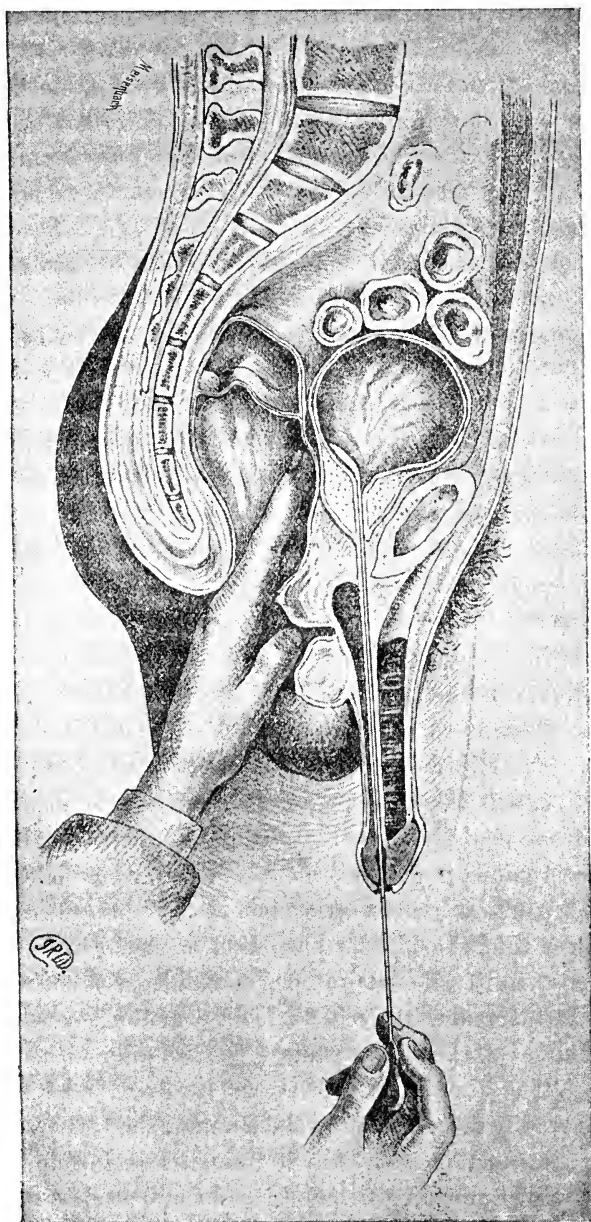


Fig. 42.

ing to the prostatic urethra, I am of opinion that the previous course is to be recommended if spontaneous evacuation is not timely obtained. I am not in favour of puncturing prostatic abscesses of any kind through the rectum.

If there is one point upon which I would desire to lay particular stress as bearing both upon diagnosis and treatment, it is the importance of a thorough examination by the rectum in all cases where there may be ground for suspecting that the prostate is inflamed or suppurating. Pain and tension have often rendered this incomplete, and an error has been the result—an error which would possibly not have arisen had all source of obstacle been removed by the use of an anæsthetic. It must not be forgotten that abscesses, sometimes of very considerable size, may form within the limits of the prostate without giving rise to such symptoms as are usually provoked. A case in point is recorded by Sir H. Pitman at St. George's Hospital, where prostatitis supervened upon an attack of gonorrhœa, and terminated in suppuration and death of the patient, with entire absence of rigors and the ordinary symptoms of abscess.

Let me say one word about an occasional consequence of follicular prostatitis. I refer to a more or less permanent state of dilatation of the follicles, and consequently a fruitful source of a chronic discharge—namely, prostatorrhœa—a condition which has been well described by Dr. Gross. Whether these dilated follicles, as furnishing receptacles in which urine may become stagnant, have any connection with the formation of calculi in the prostate, is a direction of inquiry which is hardly within the scope of this lecture.

In the treatment of prostatitis, more especially the sub-acute forms, care must be taken that pyelitis is not almost imperceptibly superadded. This is a serious complication, which may remain masked under the primary affection.

I will conclude with some observations on an inflammatory condition of the prostate which, though never, I believe,

terminating in abscess, is attended with much suffering, and not unfrequently leads to further consequences. Though this part is not so often selected for acute gouty manifestations as the ball of the great toe and the vicinity of some of the smaller joints, yet cases are sufficiently common to make the subject deserving of comment, and particularly in reference to one or two points. Gouty prostatitis, so far as I have observed it, occurs in persons who, though having a gouty diathesis, either hereditary or acquired, have previously remained free from the more ordinary attacks of this disorder. Its occurrence is often assigned to catching cold, getting wet, or sitting upon damp seats. Like gout acutely affecting the great toe, the attack usually comes on at night, the patient experiencing severe pain, which he refers to the perinæum, and not unfrequently likens to a hot cork. Though painful, the desire to micturate is irresistible, and is accompanied with spasms, which often render any attempt to retain urine, even while the patient is getting out of bed, almost impossible. Sympathetic pain is at the same time experienced in the groin, or in one or both testicles, rendering the latter extremely sensitive to the touch. Exploration of the rectum with the finger—a necessary examination, which is sometimes so painful as to call for an anæsthetic—shows the prostate to be both tense and tender. During the day the symptoms generally abate, to recur at night. Like the analogous manifestation in the great toe, these acute prostatic attacks are not usually of long duration, as they merge into a chronic form, which will presently be noticed. The urine is loaded with lithates, and is invariably of an acid and irritating character. After an acute attack the prostate is often left excessively sensitive, and this is a point worthy of special consideration. After an acute attack of gout in the foot, the limb is tender, and the person is more or less lame. So with the prostate: it remains sensitive, and the patient dreads to call forth sufficient muscular force to completely empty his bladder. In fact, he lets his urine dribble off voluntarily, and retains a

portion of it, so as to form a sort of water-bed behind his prostate. In this way he wards off from his sensitive prostate the last and most painful efforts of each act of micturition. Watch a patient, with a prostate tender from gout, pass water, and the manner in which he cautiously eases off the pressure as the act is about to close is very significant. I have satisfied myself on several occasions that a degree of retention was thus caused by passing a rubber catheter and removing an ounce or so of urine, when it was believed by the patient that he had emptied his bladder.

It is generally conceded that an hypertrophied prostate which causes urine to be constantly retained within the bladder is a condition favouring the formation of stone. I have thus endeavoured to show that the urine of the gouty is not unfrequently submitted to similar conditions, but under different circumstances. May not this consideration explain why the inorganic elements of the urine of one gouty person concrete, whilst in another they do not? Is the shortness and dilatability of the female urethra sufficient to explain the rarity of stone in women, even in those of a markedly gouty diathesis?

In the treatment of acute prostatic gout there are one or two points to which prominence is to be given. In the first place it is always associated with a highly acid condition of the urine, and with an excess of urates as well as of uric acid. The administration of alkalies under these circumstances can hardly be regarded other than as a natural expedient. It has been stated that the neutralisation of these urine-salts by the alkali is little else than masking the disorder, as the cause of it still remains untouched. But there is a mechanical aspect to this question which must not be passed by entirely without notice. One effect of the administration of alkalies upon such urine is not only attended with a marked disappearance of the urate salts from the urine, but careful microscopical observation has shown that the use of alkalies is frequently followed by a change in crystalline form, which is of considerable advantage to the

patient, though he may still continue to void urates. When the degree of vesical and urethral irritation was intense, I have seen all this disappear coincident with a change in the crystalline form being brought about by some artificial means. It is interesting to notice the relation the mucus that is deposited in the urine holds to the kind and quality of the crystalline forms existing in health as well as in disease in this excretion. Some crystals of uric-acid salts, for example, excite an immense discharge of this mucus. Such salts seem to act upon the urinary apparatus much in the same way as a foreign body in the eye stimulates a flow of the natural secretion, and renders it inordinate so long as the irritant remains there. Can it be doubted that the means we possess of influencing the urinary mucus through changes in the urine salts we are capable of artificially effecting are not important ones in relation to the subject of stone formation? Does not such a consideration take us one step further back in treating calculous disorders, or the tendency thereto, by bringing them distinctly within the scope of medicines rather than of machines?

The chronic form of the disorder, where the prostate remains tender for a considerable period, or until it is relieved by treatment, requires careful consideration, as it is a far more frequent cause of residual urine than is generally supposed. Occurring, as it often does, at a period of life when hypertrophy of the part usually takes place, the demonstration by the catheter that the bladder does not empty itself is a circumstance which is sometimes received and acted upon as conclusive evidence that the time has arrived when what Sir Andrew Clark has aptly spoken of as "the catheter life" should commence. There is this important difference, however, between the residual urine of a sacculated bladder in connection with a large prostate and that dependent on a prostate which is sensitive and merely temporarily enlarged: the former is benefited by catheterism, the latter is aggravated by it. The former is comparatively uninfluenced by medicines, whilst the gouty prostate

which interferes with the complete emptying of the bladder is speedily relieved by those measures which belong to the department of the physician rather than of the surgeon. Where the urine is rendered alkaline in the bladder by circumstances which bring about its decomposition, it is not difficult to understand how a phosphatic stone may be the result. In the view I have urged, relating to another reason for residual urine, is to be found a vesical cause for the collection and aggregation of those materials which the urine of the gouty furnish. It has been observed by Dr. Ord,\* “Two thirds of all urinary calculi are in bulk composed of or start from concretions of uric acid.”

The symptoms of chronic gouty prostatitis are often anomalous and difficult to sum up; they may be briefly enumerated as urine habitually loaded with uric acid and urates, unnatural sensitiveness of the prostate to the touch, or even to pressure applied to the perinæal region, and the presence of uncomfortable sensations referred to the neck of the bladder, as if there was a swelling, or the viscus was not emptied, the latter sensation being practically well founded. The treatment of the affection resolves itself into the employment of those general measures appropriate to the gouty diathesis, which it is not necessary for me to refer to. Iodide of potassium internally, and a mild form of counter-irritation to the perinæum, will often be found very advantageous in removing prostatic tenderness. Lastly, this is a class of disorders which is often largely benefited by some spas where the diathesis is corrected by suitable diet and waters. In our own country I have found Buxton of very great service; whilst abroad there are many watering-places which such persons may visit with advantage. It is not always easy to recommend suitable drinks for these cases. I have found the Giesshübler Sauerbrunnen a very pleasant beverage; as imported into this country I can endorse Dr. Kraus'† recommendation of it as “a very pleasant and

\* *The Influence of Colloids upon Crystalline Form*, p. 60.

† *The Mineral Water at Carlsbad*.

refreshing drink, which invigorates the nervous system, removes acidity of the stomach, gently stimulates the action of the bowels, and causes a copious flow of urine, thus combining the qualities of a good drinking water with those of a mild curative agent." It mixes well with red wine.

## TWENTY-THIRD LECTURE.

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### THE FUNCTION OF THE PROSTATE — METHOD AND OBJECTS OF EXAMINATION.

BEFORE proceeding to consider the methods of examining the prostate and what we may learn from them, it is desirable that we should have some idea as to the use and function of this portion of the genito-urinary apparatus. In these days, when we are disposed to flatter ourselves at times that our knowledge of the anatomy and physiology of the body is rapidly approaching completion, it may appear rather out of place to raise the question I have just propounded.

Structurally, I need not say anything about the prostate, as we are agreed that it is a muscle containing a tolerably large proportion of glandular or secreting tissue embedded in it. Physiologically, I do not think our position is equally clear to all, though I am at a loss to understand why this should be. Unless we start with some notion of the functions of the prostate I am sure it will be impossible for us to understand its diseases and to remedy them.

And, in the first place, I would ask you to put aside the idea that it possesses any more exalted glandular function than that which is possessed by the remaining portion of the male urethra of which it forms a part. That the prostate is a gland in respect to some elaborating process it exercises relatively to the seminal fluid is a view which cannot be substantiated by any argument that I have yet seen advanced ; and, consequently, it seems remarkable that the word "gland" should for so long a period, and so generally, have been associated with it.

In support of the position that the prostate should be essentially regarded as a muscle and not as a gland, I would draw attention to Professor Viner Ellis' paper "On the Muscular Arrangements of the Genito-Urinary Apparatus."\* In reference to the impossibility of dissociating the functions of the bladder and prostate, this author remarks: "I would propose the name *Orbicularis vel Sphincter Urethræ* for both the prostate and the prolongation around the membranous urethra; whilst I would confine the old term "prostate" (without the word gland) to the thickened and more powerful part near the neck of the bladder. This orbicularis may be considered as only an advanced portion of the circular layer of the bladder, though it must have the power of acting independently of the vesical fibres."

This view of Mr. Ellis' is confirmed by what is observed in connection with certain surgical operations on the urethra, of which the prostate forms a portion. Incisions may be made into the urethra in any part of its course, as far as what we are accustomed to call the apex of the prostate, without any incontinence following. I have seen cases of lithotomy by the median operation retain full control over the bladder during the whole period of their convalescence in spite of the dilatation to which the prostate has been subjected by the introduction of the finger and the extraction of the stone. But directly the knife impinges to any appreciable extent on the prostate, as in the lateral operation for stone, incontinence from that moment takes place; the patient has no command over his urine; he can neither collect nor expel it; and in this condition he remains until the healing process has made considerable advance. We have here remarkable evidence that the action of the prostate must be unceasing in its character, subject to the circumstances under which it has to distribute its force over the area it supports or brings into action. Where there are no such functions to fulfil, the prostate muscle is only met with in a rudimentary

\* *Royal Med. Chir. Trans.*; Lond., vol. xxii.

form, as we see in cases of extroversion of the bladder where there is no receptacle for the urine. In advanced life, so far as I have been able to ascertain, hypertrophy of the prostate in these malformations never occurs.

I have met with several cases where stones in the bladder have occupied unusual and somewhat remarkable positions relative to what may be regarded as the laws of gravity. I refer to those instances where the calculus is lodged in a sort of space hollowed out above the pubes. On two or three occasions I have had to reverse the blades of the forceps to extract stones from this position, and I have twice recently met with instances where the sound passed beneath calculi thus placed without giving a clue, and so causing errors in diagnosis which this knowledge enabled me to correct. From my observation of calculi in the bladder I am disposed to connect their occasional supra-pubic position with the upheaving movement of the floor of the viscus, which is constantly, though imperceptibly going on, principally through the medium of the spread out muscular fibres of the prostate. From the dissecting room standpoint it would seem almost impossible to understand how a healthy prostate could influence the position of a stone in the bladder in the slightest degree; when, however, we learn to recognise how differently the muscle is disposed and occupied during life from what we previously believed, it is not difficult to see that a vermicular movement of the muscular floor of the bladder, which is constantly going on, might tend to lodge and fix a calculus above the pubes. It is quite clear, however, that a stone, independent of sacculation, occupying a resting-place in the anterior wall of the viscus, must have been put and retained there by some agency. These points will, I think be found to have their bearing upon the practical surgery of the parts referred to.

In addition to the anatomical grounds there are certain pathological conditions which strengthen the view that the prostate is essentially a muscle and not a gland.

The only form of inflammation to which the normal prostate, so far as my experience goes, is liable, is that which primarily involves its numerous follicles; by the suppuration and coalescence of these follicles the whole area of the prostate may be converted into an abscess. Though I have known many instances in adults about the age of puberty where the secreting portion of the prostate must in this way have been completely and permanently damaged, I cannot say that I ever knew such a suppuration followed by either sexual or procreative inability, and though the prostate may not be damaged to the same extent in most cases of lateral lithotomy, and operations of a like nature, if it were essential to procreation we might expect to find a certain number of fairly well authenticated cases where this function was thus brought to an end. My experience of these operations, which has been tolerably large and varied, does not furnish grounds for believing that the procreative power has been interfered with by them. That so important a function should, as it were, be made dependent on the integrity of two organs situated at a distance from each other seems, on the face of it, to be unlikely. It appears to me that the office of the prostate relatively to the sexual act is that referred to by Dr. Handfield Jones\* in the following passage:—"These considerations furnish some ground for regarding the prostate as rather an assemblage of mucous follicles than really a distinct conglomerate gland; its part in the generative function is probably not to prepare any essential element of the fecundating fluid, but merely an appropriate viscid material involved in which the seminal animalcules may be more securely transported on their destined route." The wide difference that exists in the pathology of the prostate and the testis seems to point to their being engaged in very different functions; the former comprehend those changes which we might expect in a part consisting of follicles embedded in muscle, whilst in the latter they are those which can only happen to a highly organised

\* *The London Medical Gazette*, vol. 5, 1847.

gland where everything is subservient to the secreting process. I should sum up the function of the prostate relatively to the sexual act as supplying a vehicle which enables the fecundating fluid to act with greater certainty over a larger area, whilst at the same time, it supplies a muscular buttress against which the ejaculatory muscles of the urethra may advantageously act in the emission of the semen.

I will now proceed to consider the examination of the prostate; this is best done, easiest alike to patient and practitioner, by placing the former, when this is feasible, with his abdomen over the end of a sofa, or over a couple of pillows at the side of the bed, with the shoulders well depressed and the legs slightly apart. By this plan the finger enters the rectum with much less resistance on the patient's part, whilst the surgeon has his hand freer with the palmer surface of the index finger directed towards the prostate. I should hardly have felt it necessary to make any reference to what I believed to be the best mode of examining the prostate from the rectum, did I not feel that it compared favourably on all grounds with other ways of effecting the same purpose. With the patient on his side or his back, on a bed or a sofa, it is impossible to obtain the same information as when the manipulation is conducted in the position I have ventured to advocate. I can only remember one instance where an examination of the prostate was not allowed me on the ground that the process would be painful to the patient; this was in a railway case, where, in an elderly man, certain symptoms connected with the act of micturition were attributed by the plaintiff to the injuries received. I would also advise you to take opportunities of examining patients with healthy prostates, so that you may the better judge for yourself what constitutes a normal condition of the part; and, in the next place, that you may form some idea of the function of the prostate in relation to the bladder and its contents.

We have been too much accustomed to regard the prostate from its *post-mortem* aspect—that is to say as a mass of muscle

(Figs. 43 and 44) about the size and form of a chestnut, in

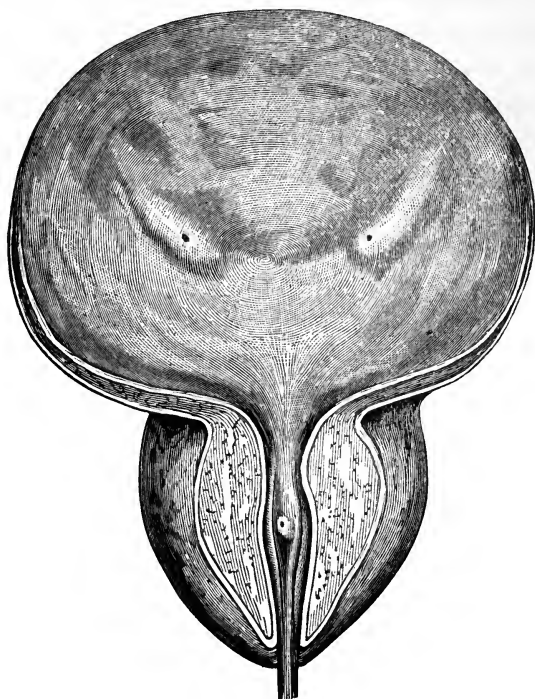


Fig. 43.

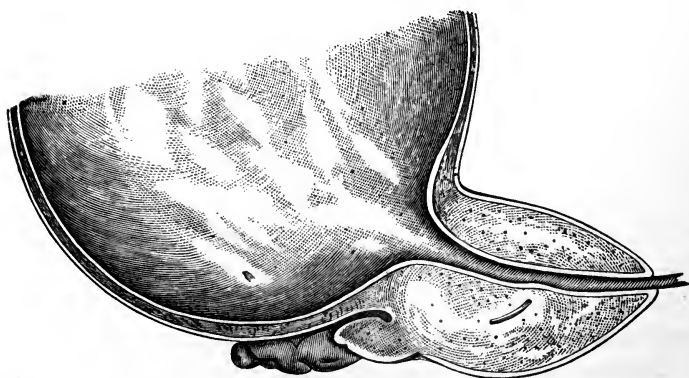


Fig. 44.

which is contained some secreting tissue. It will be as well clearly to understand that under no circumstances during life, save the rare and momentary one when the bladder is absolutely empty, does the healthy prostate present such a form as that referred to; on the contrary, the muscular fibres of which it is largely composed are spread out like a funnel, so as to form an ample support for the bladder and its varying amount of contents. The degree to which it is spread out is, of course, relative to the contents. Hence the action of the prostate may be said to be just as continuous as that of the heart. This is a point which can be readily determined by examining persons in different bodily positions, and under varying circumstances so far as the contents of the bladder are concerned. If a person is examined by the finger in the rectum when he is in a semi-erect position, with a healthy prostate and some urine in the bladder, it will be found that the limits of the prostatic area are bounded on either side by a marked ridge of muscular fibre in a state of more or less tone, whilst the centre of this area is softer and more yielding to the touch. In making an examination of this kind for the first time, and taking our idea from what we have previously learnt in the dissecting-room, we naturally expect to find the converse of this—namely, a rather hard centre, which gradually loses its definition as the finger passes towards the sides. It is a matter of common remark that, unless the prostate is abnormal, a young surgeon has to examine it a good many times in the living male before he thinks he can realise what he has learnt as a part of his anatomical studies.

In early life, that is to say, at about sixteen years of age, it is not easy to make out what I would speak of as the boundaries of the prostate; the parts are soft and yielding, and it is difficult for this reason to detect any early alteration in structure should such have taken place. Under these circumstances I generally examine these parts with “a point of resistance” to support them. That is to say, if I wish to search for any

structural change in the boy's neck of the bladder or prostate, I first pass a soft bougie into the bladder; this gives me something to feel upon, and in this way structural alterations, such as slight tubercle deposit or new growth, are readily felt; whereas without this precaution, they would be just as easily missed. A normal prostate has practically no structural elevation within it; that is to say, if a bougie is passed along the urethra into the bladder no obstruction or irregularity should be felt. When I come to speak of the examination of the hypertrophied muscle, I shall have to attach almost as much importance to the bladder aspect of the part as I have now done to the rectal.

But before going further, I must draw your attention to the many important points you will notice during the course of a rectal examination of the prostate. You are to judge of the *size* of the prostate, its *sensitiveness*, and its *consistence*; upon these three points your diagnosis may be formed without asking a single question, just as in the same manner you may form an opinion of the breast of a female, who has grounds for complaint, entirely from the touch. In the vast majority of prostatic cases the statement of the patient, though received and considered, may almost be regarded as superfluous if the examination of the part is thorough and complete. Let me illustrate what I mean: the *size* of the part will enable you to judge of atrophy and hypertrophy, irrespective of symptoms; *sensitiveness* will cause you to detect inflammatory conditions; whilst the *consistence* of the part will enable you to form an opinion in reference to fluid, tumour, cysts, tubercle, and the kind of hypertrophy, whether the latter is more fibrous or more muscular, and so to anticipate and prognosticate the course of events. I have only thus endeavoured to sketch; I shall hope to fill in details as I go on.

In a previous lecture you will find illustrations of the value attached to a careful examination of the prostate in urinary tuberculosis; it often proves, as it were, the key-stone of the

diagnosis. I have frequently pointed out instances where the detection of a small deposit within a follicle, perhaps not bigger than a millet-seed, has indicated that the urinary apparatus is more or less infected with tubercle. We shall meet with other examples of this as we proceed.

## TWENTY-FOURTH LECTURE.

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### THE CAUSATION AND NATURE OF HYPERTROPHY OF THE PROSTATE.

IN the previous lecture I have given utterance to the view that what we are accustomed to speak of as the prostate is to be regarded as a muscle and not as a gland. On this occasion I would further express my belief that senile hypertrophy of this part has its origin in the development of conditions which are generally recognised as capable of producing similar effects in other parts of the body which largely consist of muscular tissue. Not only shall I endeavour to adduce what appears to me to be evidence of an additional strain being thrown on the muscular parts forming what we are accustomed to speak of as the neck of the bladder, but to show that, like other hypertrophies referred to in general terms, this also can be useful when it is precise, and hurtful when it is excessive. In the course of some investigations made in reference to the prevention and early treatment of prostatic obstruction, I could not help observing how often it happened that a frequent desire to empty the bladder preceded all physical signs of enlargement of the prostate. Further, I demonstrated that if at this stage of affairs the person who complained of this annoyance received some temporary assistance with a suitable bougie or catheter, hypertrophy of the prostate was avoided; whereas, on the other hand, if no such aid was afforded, frequent micturition under these circumstances was almost invariably to be regarded as the forerunner of enlargement. It appeared clear to me, from actual demonstration with the catheter, that residual urine, in a greater or lesser degree, invariably preceded physical signs of prostatic hypertrophy.

These cases seemed to be difficult of explanation except on the ground that the incomplete emptying of the bladder was due to some alteration in the shape of the viscus itself.

In the examination of the bladder, both after death and in the course of surgical operation, it is impossible not to be struck with the altered relations which frequently exist between the viscus itself and its neck or outlet. In early adult life the bladder may be regarded as an abdominal rather than a pelvic organ; as years advance it gradually sinks within the pelvis, whilst still later on it will often be found to have become further depressed within the pelvic cavity. In this way I have seen a prominence given to the floor of the prostate which was really due, not to the development of more prostate tissue, but to the bending back of the posterior wall of the bladder. When it is considered that the prostate is almost immovably fixed by ligament in its position, whilst the bladder can rise or fall according to circumstances, it is not difficult to understand how this can be, and how an obstacle may be put in the way of micturition which does not necessarily involve an increase in the amount of prostatic tissue. This mode of forming a prostatic bar may be very readily imitated.

Assuming that from any cause such as long retention of urine, habit, position of the body, or the weakness connected with advancing years, the floor of the bladder sinks lower within the pelvis relatively to the prostate, so as to offer some difficulty in expelling the least portion of the urine, the effect will be frequently repeated efforts in all the muscles immediately adjacent to a part of the bladder which, by reason of its connections and structure, has but little power of contracting. This will eventually lead, as I have endeavoured to show,\* to the development of a strong muscular buttress between the orifice of the ureters, and also, I believe, to similar changes in the muscular tissue so largely entering into the prostate, and prin-

\* "On Some Changes in Form of the Prostate and Floor of the Bladder." *Liverpool Med. Chir. Journal*, July, 1885.

cipally affecting its posterior segment. In this way, the pouch formed above the prostate may be more or less obliterated, as may be seen in some of the plates illustrating the paper just referred to in the footnote.

Figs. 45, 46, 47, 48, show how a strong muscular floor may be made for the bladder by the coalescence and hypertrophy of



Fig. 45.

the inter-ureteral bar and the prostate. I am obliged to Dr. Alexander for letting me have the specimen which is represented by Fig. 48. It further shows how a secondary pouch may be formed above the inter-ureteral bar. In this instance suppuration took place in this pouch, and the matter it contained eventually made its way beneath the prostate and presented towards the perinæum. A specimen such as this

explains those rare cases where the bladder may be opened into from the perinæum without involving the prostatic urethra.

To resume. Structurally, the inter-ureteral bar and the hypertrophied prostate are identical, with the exception that in the latter will be found the follicles which have led to its being regarded as a glandular body.



Fig. 46.

It may be incidentally referred to in support of the view that these changes are of the nature of muscular hypertrophies, such as we are accustomed to regard them, that the only means which are known to have caused the opposite state, namely, that of atrophy, to be engrafted on the hypertrophied part, are those which for a considerable time converted a muscular and physio-

logical act into a purely mechanical one ; for instance, the case I published some years ago\* (since repeated with equally satisfactory results) where, by the wearing of a cannula inserted through the perinæum, the process of micturition was reduced to the mechanical act of turning a tap on the part of the patient.

I have frequently noticed that condition of unnatural con\_

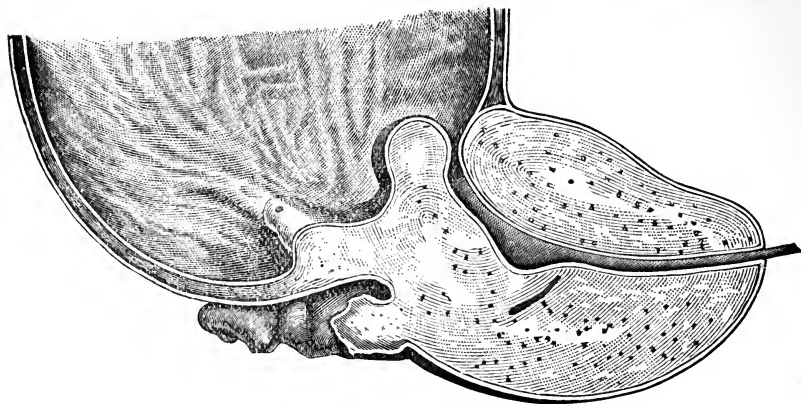


Fig. 47.

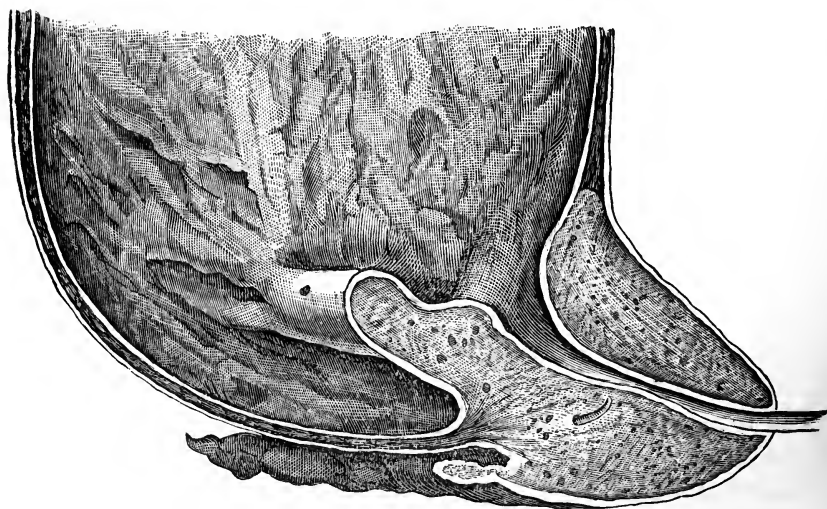


Fig. 48.

\* *British Medical Journal*, Dec. 24, 1881 ; and April 8, 1882.

tractility about the muscles connected with micturition to which Sir James Paget's expression of "stammering with the urinary organs" may be applied, precede prostatic hypertrophy.

But it may be urged that if repeated expulsive action on the part of the bladder causes enlargement of the prostate to follow, how is it that stone and urethral stricture do not in like manner

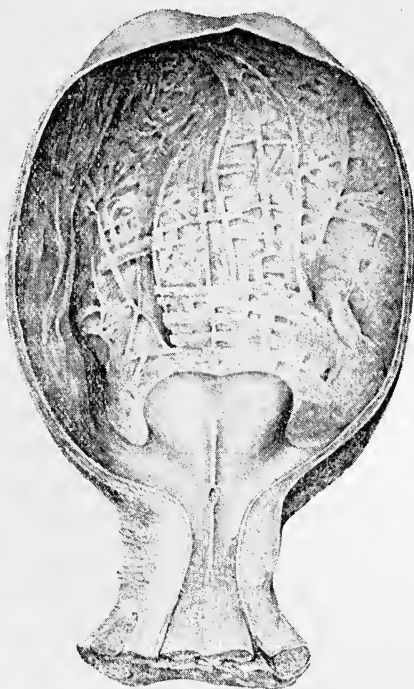


Fig. 49.

occasion it as a uniform consequence? To this I would reply that stone and stricture as excitants of expulsion are general or varying in their operations, and do not, as a rule, merely involve a limited area of the bladder wall, consequently the hypertrophy following stricture is universal so far as the viscus is concerned. In the same way, the *whole bladder* is implicated when a growing prostate (Fig. 49) has arrived at that stage

when it becomes in addition an obstacle to micturition. When a stone is *fixed* to the bladder, it is, I believe, subjected to precisely similar influences on the part of the bladder wall immediately adjacent to it as those described in connection with the trigone, and may result, as I have seen, in a circumferential development of muscular tissue sufficient in some instances to produce sacculation. This is not an uncommon process, and may be studied with advantage in those cases where secondary calculi are developed as a consequence of surface irregularities produced by a large prostate which I have referred to elsewhere as fixed or stationary stones.\*

It has been objected that enlargement of the prostate cannot be regarded as a mere muscular hypertrophy, as it does not occur during those periods of life which are most remarkable for muscular activity and development. On the other hand, it is hardly necessary to remark that, though an hypertrophic act, in which muscular tissue is principally involved, it is really prompted by alterations in the form or function of a contiguous part which are the products of advancing years.

It may not be out of place to observe in connection with analogous processes of hypertrophy, which in general terms have been referred to, that the best marked are those where structural defects are remedied, not in the part itself at fault, but in that which is adjacent. In the heart it is not the valve that is reproduced, but the ventricle or auricle which is augmented. Nor does the analogy cease here, for as the hypertrophied heart in turn occasions symptoms peculiar to itself, in like manner does the large prostate produce its own derangements. The changes and diseases to which the hypertrophied prostate is liable, and about which there is much to be said of great practical value, must, however, not be confounded with the primary lesion it is desired here to refer to.

I have referred to prostatic hypertrophy being compensatory in some instances, whilst in others it is obviously detrimental.

\* *Annals of Surgery*, June, 1885.

It is stated by Sir Henry Thompson \* “that actual hypertrophy of the prostate exists in about 34 per cent. of men at and above sixty years of age ; that it produces manifest symptoms in about 15 or 16 per cent.” From this it would appear that 18 per cent. are not injuriously affected by this change, a circumstance which almost seems to suggest that the majority of persons with large prostates are in some way or other benefited by them. These are illustrations where the compensation is precise. How frequently it happens in our daily practice that we come across instances of persons having very large prostates, but who are not conscious of suffering any inconvenience thereby. It is only recently, when examining the rectum of a patient, I discovered that he had an enormous prostate, but beyond experiencing some degree of vesical irritability a few years ago he had now nothing to complain of so far as micturition was concerned. A good idea of the amount of support that is afforded to the most dependent portion of the bladder by a large prostate may be formed by examining such a patient as I have just referred to with the finger in the rectum when he is placed in the erect position. By this means we can judge of the value—I was going to say the comfort—of a large prostate to some elderly males with incompetent bladders.

But it may be urged that, though some cases of enlarged prostate appear capable of explanation on the ground that they are essentially hypertrophies in the usual acceptation of the term, there are others where such an explanation is not so apparent. In the latter category reference no doubt will be made to those instances where the prostatic mass is made up of more or less lobulated projections (Fig. 49). These I would speak of as the upheavings of a frequently contracting muscular ring. In a muscle or part undergoing hypertrophic growth, and where the process is prompted by circumstances which are obviously liable to some degree of variation, tissue production may be excessive or become unnecessary. Such excess would

\* *Diseases of the Prostate.*

naturally tend, under the contraction of the part, not only to protrude itself where the resistance was least, but to assume a more lowly organised form than that originally produced. In this way, I believe, these masses of more or less degenerated prostate tissue are formed, and just as there is a wide difference between the irritability of the bladder associated with the initial stage of the hypertrophying prostate and that caused by the fibrous projections of the gland just referred to, which produce symptoms quite as irritating to the bladder as any stone, so is there a corresponding difference in the residual urine which accompanies each of these states.

In a paper by Mr. Savory,\* he points out that the mere retention of a certain quantity of changing urine, though constantly occupying the bladder, cannot be regarded as explanatory of its decomposition. Because a bladder does not completely empty itself, as in the initial stage of prostatic hypertrophy, this by no means implies that what it contains is stagnant and liable to decomposition. A constant stream, though a small one, through a standing pool of water ensures sufficient interchange to prevent putrescence or anything approaching it. So long as normal urine enters a bladder capable of expelling, though incompletely, so long will what is retained remain unchanged, provided that nothing is brought in relation with the interior of the bladder which can act the part of a foreign body. A prostate with fibrous outgrowths is positively more irritating to the interior of the bladder, more productive of cystitis and mucous exudation, than almost any calculus that can be met with. It is under these circumstances that we have a very different form of residual urine to that previously alluded to. In practice it is necessary that these distinctions should be recognised.

The views I have urged, that the growth of the prostate, as well as the inter-ureteral bar, are only examples of limited

\* "On the Relation of Partial Retention of Urine to its Decomposition in the Bladder," *The Lancet*, Oct. 14, 1882.

hypertrophies to meet special requirements in connection with the collection and expulsion of the urine, have received some support from a demonstration by Mr. Fenwick\* that the anterior wall of the bladder in cases of stricture may become hypertrophied quite out of proportion with the remainder of the viscus. We have here an illustration that the disposition of force, as evidenced by increased muscular power, is determined by circumstances which hitherto we have failed to recognise sufficiently.

My remarks I need hardly say have been entirely confined to the male bladder. It may be asked, may not the female be placed under similar circumstances requiring corresponding contrivances as aids to expulsion and support? It is hardly necessary to say that there can be no analogy between the two conditions. The structural arrangements of the parts in the female, the relations of other organs, the mechanism of micturition, the axis of pressure, and the method of supporting the bladder, whether distended or collapsed, are in the female so different that it would be useless to attempt any comparison. In expressing my own views upon this important subject of prostatic hypertrophy, it is only right that I should mention that there have been, and still are, many speculations relative to the causation of this remarkable disorder. Diet, exercise, procreation, occupation, gout, rheumatism, and other local disorders have all been referred to in their turn, as direct or contributing causes; I venture, however, to urge that, like other hypertrophies, its true explanation lies in the recognition of its function.

\* Pathological Society of London, Jan. 18, 1887.

## TWENTY-FIFTH LECTURE.

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### SYMPTOMS AND CLINICAL ASPECTS OF ENLARGED PROSTATE — THE PREVENTION OF PROSTATIC OBSTRUCTION—HYGIENIC SUGGESTIONS RELATIVE TO THE BLADDER.

I SHALL now pass on to consider the clinical aspect and treatment of hypertrophy of the prostate when it presents itself to our notice as a disorder, and this I can do without any prejudice to the views I have felt it my duty to lay stress upon in reference to the causation and pathology of this enlargement.

The careful inquirer will seldom fail to discover that in all prostatic cases of this kind there was a premonitory stage, more or less marked, when frequency of micturition was noticed, if not complained of, occurring usually somewhat after the meridian of life, when the power of resistance of the tissues of the body is not so great as it used to be. For this frequency of micturition various causes are often assigned, many of these being clearly connected with what would occasion some undue or unnatural strain on the retaining powers of the bladder and its co-ordinating parts. As I have said before, whatever construction you may place upon the course of subsequent events, if you do not allow this opportunity to pass by unheeded, if you recognise *that frequent micturition in nineteen cases out of twenty means imperfect power of emptying the bladder*, and come to the patient's assistance, should he seek your advice, with a little artificial mechanical aid to the incompetent bladder, you will succeed in warding off enlargement of the prostate.

As a rule, however, persons with large prostates only seek our assistance where the changes are of such a degree as to cause more or less interference with the act of micturition.

That this symptom must frequently be the case is at once evident from the examination of specimens (Fig. 49) illustrating this condition. Here the prostate has grown in such a manner as obviously to obstruct micturition. Persons who are really suffering from their large prostates are inconvenienced, so far as the act of urination is concerned, in a variety of ways, many of which are clearly due to mechanical causes preventing the function of the bladder being completely performed. In one class of cases the growing prostate seems to act as an irritant; a patient will make water, or try to do so, far more frequently than is natural both by day and night, at all times experiencing the sensation that the act was not followed by the least relief. I might multiply examples of this showing how different postures of the body, various kinds of movements, the act of rising from the sitting to the standing position, seemed to excite urination. In some instances there is obviously a co-existing condition of congestion about the part, as slight hæmorrhage at the close of micturition sometimes occurs under the circumstances I have mentioned.

Persons with large prostates are liable to occasional attacks of hæmorrhage from the bladder, which seem to be excited by slight causes, such as exposure to cold, and the fatigue which is incident to long standing or walking. I have met with many instances of this. As a rule, it is a mere temporary annoyance, which need neither occasion alarm nor call for too active treatment for its suppression. Rest, warmth, mild laxatives, and a little patience, will generally be found sufficient to bring about a cure. The bleeding usually comes from the veins of the bladder, which may often be found to present a somewhat varicose or dilated condition. It is hardly necessary to say that this has nothing to do with the prostatic plexus of veins. I am not sure that elderly persons who suffer in this way from periodic attacks of bleeding are not spared some of the other inconveniences associated with prostatic obstruction in its more advanced forms.

It must not be overlooked that various pains and altered sensations, principally in the back, the nates, and down the thighs, reflected and as the result of direct pressure, are sometimes caused by large prostates. Curiously enough I have noted these symptoms oftener in persons who had insufficient reasons for coming to such a conclusion, yet examination by the rectum has frequently proved them to have prostates of exceptional size.

Other patients are irritated sexually by their prostates, and much annoyance in this way is thus often occasioned. In connection with this last mentioned circumstance I may briefly allude to a case communicated to me by my friend, Dr. Christopher Johnston, of Baltimore, where a man, aged sixty-two years, was charged with abandoning his wife and resorting to incestuous connection:—

The defence, while admitting as a fact that the man and the girls had shared the same bed, denied that the sexual act had ever been performed; and insisted that the accused could never have effected penetration, because he was at the time, and had a long time before been, the subject of enlarged prostate, and it was claimed by counsel that the prostatic enlargement was a bar to the sexual act, for the reason that it occasioned such pressure on the *erectores penis* as to draw the male organ downward and render coitus impossible.

Such a line of defence however is clearly untenable.

For clinical purposes it will be necessary to classify the circumstances under which cases of prostatic hypertrophy present themselves. Before doing this, I would remind you that the evidence of such a change will be determined not only by the symptoms which each patient presents, but by actual examination of the part with the finger or an instrument. It is hardly necessary to say that our attention will at once be directed towards the state of the prostate in all instances of males, of about sixty years of age, who have reason to complain of the mechanism of micturition. Rectal examination of the prostate, as I have already described in a preceding lecture,

will enable us to determine, as a rule, whether the part is enlarged, and the size it has attained; on the other hand, instances will be met with where there is no enlargement appreciable to the finger in the rectum, but where, for all this, obstruction is occasioned on the bladder aspect of the part. In the determination of the condition of the prostatic urethra we must rely on the use of one or other of the instruments suitable for prostatic cases which will presently be mentioned. As a rule, where there is much internal obstruction, as by a prostatic bar of tissue, the handle of any metal instrument has to be depressed considerably before the bladder can be entered. This is often a painful process, and where it is necessary it should be at once anticipated as the instrument enters the prostatic urethra. When this is suspected to be the case the instrument should be withdrawn and the patient be offered an anæsthetic before the examination is completed.

Having determined the presence or absence of signs of prostatic enlargement, I will now proceed to classify the circumstances under which this condition presents itself to our notice.

1. Cases of irritable bladder connected with the earliest forms of prostatic obstruction.

2. Cases of obstructing prostates with more or less permanent residual urine.

3. Cases of obstructing prostates with completely atonied or powerless bladders.

4. Cases of sudden and complete retention, with obstructing prostates.

5. Cases of obstructing prostates in their most advanced forms, usually complicated with more or less inflammation of the bladder.

6. Cases of enlarged prostates complicated with stone or tumour in the bladder. These will be reserved for consideration in connection with their respective complications.

*First.* Cases of irritable bladder, due to the earliest forms of prostatic obstruction. Some years ago I drew the attention

of the profession \* to the great advantage following the use of suitable bougies on the earliest appearance of signs indicating that the enlarging prostate was encroaching upon the urethra and tending to obstruct it. I did so because I had frequently observed instances where, though there was considerable hypertrophy there was no obstruction, as the urine escaped along channels and grooves formed in the growing tissue. This seemed to me to be capable of imitation for a useful purpose, which has proved to be the case.

For this object I instruct patients of this class to get into

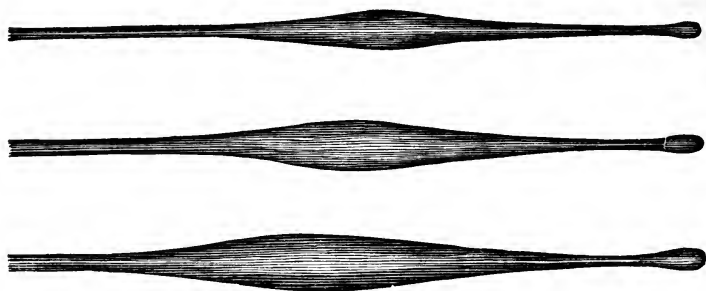


Fig. 50.

the habit of passing a soft bougie for themselves daily, or every other day, promising them that if they do so they will derive considerable benefit, and that their powers of micturition will improve, if not be completely restored. As a general rule, I would say the bougie that goes in easiest is best for this purpose. Its size may from time to time be increased with advantage. I believe the instrument which best answers this purpose is the bougie olivaire, of which I have selected some (Fig. 50) different sizes. †

The olive-shaped dilators exercise as much pressure as can be desired on the obstructing portion of the prostate, whilst, by

\* *The Prevention of Stricture and Prostatic Obstruction*; Churchill, London, 1881.

† These instruments may be obtained from Mr. Wood, 81, Church Street, Liverpool, or Messrs. Tiemann, New York.

reason of the small size of the stem, no tension is thrown on the most sensitive portion of the urethra—namely, the orifice.

I have these prostatic dilators made from two to four inches longer in the stem than ordinary urethral bougies, in order that the olive portion may be fairly passed into the bladder. In this way pressure is exerted on the prostate as the expanded part passes into the bladder, and again as it is withdrawn. It is very important that the instrument should be used in this way, as the dilatation exercised by the bulb, on the withdrawal of the bougie, corresponds with that of the urine as it is expelled from the bladder.

The patient should place himself in the recumbent position, with the buttocks slightly raised, and then, having lubricated the bougie freely with vaseline, and made it pliable by drawing it a few times through the hand, he should slowly introduce it until the expanded portion is fairly within the bladder; he then gently withdraws it. In this way, as I have already explained, the prostate is twice acted upon by the expanded portion of the dilator. At first the instrument may be passed once in forty-eight hours, subsequently twice, and in cases where the prostate has already become large, I have caused it to be used night and morning with satisfactory results. My attention was first called to this practice some years ago by:—

The case of an elderly gentleman who, in the belief that he had an enlarging prostate, took means which proved successful to prevent the occurrence of retention. Long before I knew him, he was told by a distinguished surgeon that his slight urinary troubles were the early indications of an enlarged prostate, and that sudden retention of urine was a not improbable event. This so alarmed him that up to within a short time of his death (which was from other causes) he never allowed a day to go by without passing a full-sized gum-elastic bougie for himself. He remained quite free from any urinary inconvenience, a circumstance which he attributed to the means he adopted. I made a *post-mortem* examination, and found that, though the middle lobe of his prostate was considerably enlarged, the level and patency of the prostatic urethra were in no way altered, the growth or enlargement

being, as it were, deeply bisected by the canal, as represented in the accompanying figure (Fig. 51). It appeared to me, to use the phrase of my patient, that "the maintenance of the water-way" was directly traceable to the persistent catheterism employed.

It seems to me very unphilosophical that surgery should, as it were, stand by and permit one of the most important passages within the body to become seriously obstructed without making any effort to prevent it. I cannot help thinking that the way in which the prostate has been dissociated from the rest of the urethra is in a great measure responsible for this somewhat anomalous proceeding. If any other portion of the urethra showed signs of becoming obstructed, whatever might be the age of the patient, I undertake to say we should not allow it to



Fig. 51.

proceed and content ourselves with waiting until retention of urine supervened.

Let me illustrate this practice by the narration of another case.\*

In 1881, a gentleman, of sixty years of age, consulted me for an irritable bladder. Not only was there unnatural frequency in passing urine, but the act had lost its natural characteristics, for instead of the urine being expelled in a stream, it seemed rather to ooze from the penis. Though an examination of the prostate from the rectum revealed but little amiss with the prostate, further investigation determined—first, that there was a considerable obstruction within the prostatic urethra; and, secondly, that the bladder was beginning to lose its power. Under these circumstances, I advised the patient to introduce a soft instrument into his bladder daily until further instructed. In the course of three months he was practically well, and, beyond passing his instrument occasionally for his own satisfaction, he has remained so.

\* *The Lancet*, Jan. 16, 1886.

Can it be doubted that this marked change was due to the use of the instrument? What would the patient's condition have been within six months had nothing of this kind been done. In an experience of this kind which has not been inconsiderable, I think I may say that where there exists any mechanical obstruction, however slight, to the escape of urine along the urethra from the bladder, I have never known any harm come when an instrument adapted to the particular case has been selected and is properly used. Where these conditions are not complied with, it is not remarkable that the results should be disappointing. On the other hand, the evidence of patients themselves as to the immediate and permanent advantages attending the employment of mechanical means in the earliest stages of prostatic obstruction is sufficiently ample to render further allusion to this aspect of the question unnecessary. It is, however, curious to notice the sort of prejudice that still lingers in regard to the local treatment of an obstructing prostate. It is alleged that it will set up irritation in the part. But is there the least evidence to support such an idea? On the contrary, I believe there is none. If there is one organ in the body more tolerant than another, I am sure it is the prostate. We cut it in lithotomy, we remove portions of it with our fingers or the forceps when it gets in our way, we enucleate tumours from it, it gets many a hard blow from an ill-directed catheter, it is a frequent neighbour of about the most virulent discharge the human body is capable of producing,—and yet how many specimens illustrating inflammation of it, or its effects, can the museums of this country furnish? I submit there is no evidence to prove that the prostate is ever hurt by the employment of well-directed mechanism; on the contrary, it will yield to its influence far more readily, as a rule, and show more tolerance of it, than the majority of urethral strictures. We might just as well say, because we occasionally find strictures exceedingly irritable, that their treatment was to be postponed until either retention of urine or cystitis were provoked. But

even if the prostate were intolerant, it seems to me in the class of cases to which I am referring, where there is some degree of interference with micturition, it is only postponing the evil day until the necessity is greater and the difficulty more apparent. If there is danger of irritating the prostate, it is none the less because its size is larger.

Though it is upon mechanical measures we must place chief reliance in the controlling of prostatic enlargement and preventing interference with micturition, I have also for some years been in the habit of laying stress upon the following points in advising persons who have reason to believe that they are suffering from the earlier symptoms of the affection :—

1st. To avoid being placed under circumstances where the bladder cannot be emptied at will.

2nd. To avoid checking perspiration by exposure to cold, and thus throwing additional work on the kidneys. In climates such as our own, elderly persons should, both in summer and winter, wear flannel next the skin.

3rd. To be sparing of wines, or of spirits exercising a marked diuretic effect either by their quantity or their quality. Select those which promote digestion without palpably affecting the urinary organs. A glass of hot gin-and-water, or a potent dose of sweet spirits of nitre, will not do anything to remove the residual urine behind an enlarged prostate.

4th. To be tolerably constant in the quantity of fluids daily consumed. As we grow older our urinary organs become less capable of adapting themselves to extreme variations in excretion. Therefore it is desirable to keep to that average daily consumption of fluids which experience shows to be sufficient and necessary. How often has some festive occasion, where the average quantity of fluid daily consumed has been largely exceeded, led to the over-distension of a bladder long hovering between competency and incompetency. The retention thus occasioned, by suspending the power of the bladder, has frequently been the first direct step towards establishing a per-

manent, if not a fatal, condition of atony or paralysis of this organ.

5th. It is important that from time to time the reaction of the urine should be noted. When it becomes permanently alkaline in reaction, or is offensive to the smell, both prudence and comfort indicate the regular use of the catheter.

6th. Some regularity as to the time of performing micturition should be inculcated. We recognise the importance of this in securing a regular and healthy action of the bowels, and though the conditions are not precisely analogous, yet a corresponding advantage will be derived from carrying out the same principle in regard to micturition.

The sum of these instructions is, that as we cannot always arrest the changes by which the prostate becomes an obstacle to micturition, it is obviously of the first importance that every means should be taken to compensate for this by promoting the muscularity of the bladder and preventing it becoming atrophied or paralysed either by accident or improper usage.

Of the medicines that I have found most useful, in conjunction with mechanical means, in restoring the tone of the bladder, I would mention the ergot of rye, which I generally give in the form of the fluid extract in cinnamon-water. Further experience only strengthens the good opinion of this drug I have elsewhere expressed in the treatment of this complication of prostatic enlargement.

The other circumstances in connection with prostatic hypertrophy under which patients present themselves will be considered in another lecture.\*

\* I have discussed at some length and illustrated the changes in form of the outlet from the bladder, due to prostatic hypertrophy, in my article "On Diseases and Injuries of the Bladder and Prostate," in the last volume of Ashhurst's *International Encyclopædia of Surgery*, 1886.

## TWENTY-SIXTH LECTURE.

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### COMPLICATIONS OF PROSTATIC HYPERTROPHY—ON SELF-CATHETERISM.

THE *second class* of case we meet with in practice associated with a large prostate, is that where more or less residual water is always to be found which the viscus is unable to void spontaneously. As I have already pointed out, there are two kinds of residual urine—one due to an imperfect contraction of an apparently normal bladder, as we see sometimes in ataxic bladders and in the premonitory stage of prostatic hypertrophy; and another, arising from the growth of the prostate by means of which a structural barrier is raised against the expulsion of a certain amount of urine. These are important distinctions to draw; for in one instance, as I have already explained, we have residual urine that is not liable to decompose, whilst in the other it is extremely prone to do so. I am not aware of any reasons why residual urine, so far as it is concerned, need be interfered with so long as it occasions no symptoms of its presence and shows no signs of injurious decomposition. When you find a patient who, by reason of a large prostate, always has about two or three ounces of urine in his bladder, which he cannot spontaneously expel, and is the better for getting rid of it with a catheter before he attempts to go to sleep, here is a case which is obviously benefited by judicious instrumental interference. Without the use of the catheter, the patient finds out that he is up half a dozen times in the night straining and wanting to empty his bladder, which he cannot accomplish; whilst, by the use of the catheter, he discovers that he can sleep

almost the whole night. Again, there are cases of residual urine associated with prostatic enlargement, where the patient finds after a time that not only is his bladder very irritable and uncomfortable, but also that his urine is more or less offensive. Examination of the urine shows it to be loaded with mucus; it is alkaline to test paper, and exhales a disagreeable ammoniacal odour. It is clear from the circumstances under which it is passed that it is undergoing decomposition within the bladder, and this decomposition will ultimately end in exciting inflammation, not only in the bladder itself, but possibly also in more remote organs, such as the kidneys.

Here we have indications, not only for regular catheterism, but for washing and soothing the bladder, as will be described in a future lecture. I am not aware that there are any other cogent reasons for interfering with residual urine; if there is no evidence of its doing harm it is probably safer to leave it alone, unless we are prepared, at the same time, to supply its place with a suitable antiseptic. But though residual urine may not in itself be hurtful by its decomposition, or painful by its presence, care must be taken in those who are known to have it that it is not allowed, as it were, imperceptibly to increase. This has sometimes happened with the result, not only of greatly distending the viscus without the person being conscious of it, but further, of inducing a condition of permanent atony or paralysis, which will be considered under a subsequent heading. When the time arrives in cases of this kind that catheterism seems no longer avoidable, the operation must not be too lightly entertained, especially in the old and feeble, with possibly incompetent hearts or lungs. To some it has proved a shock which neither friends nor attendants seemed to anticipate. So long as the reasons for resorting to it are sound, and it is dexterously performed, we cannot be held responsible for anything untoward that may follow. I should not consider, for instance, the mere fact alone that an elderly man has to pass water two or three times to a younger man's once, sufficient

reason to urge upon him the necessity of commencing, what Sir Andrew Clarke has spoken of as, "the catheter life." Nature must demand the assistance of art in louder terms than these, and then we have the best guarantee that all will be right.

Where the urine is acid and the bladder never emptied in elderly males with large prostates, I have often succeeded in getting gradual contraction and emptying of the viscus by the simple expedient of making the patient introduce a small whip-bougie for himself daily. This process clears the prostatic urethra of mucus, acts as a stimulant to the atonic bladder, and paves the way for catheterism, should this eventually prove necessary.

The *third class* includes cases of obstructing prostates with completely atonied or powerless bladders. Cases of sudden retention of urine are sometimes followed by what may be described as paralysis of the bladder; in some the paralysis is permanent, whilst in others, by judicious treatment, the viscus again obtains its power of self-contraction. In some instances, the bladder has become so atonied, and is so largely distended, that practitioners have thought at first sight they were treating ascites instead of urinary retention. We must always be on the alert in cases of central abdominal protuberances for contingencies of this sort. A patient may be dribbling urine under the impression that he is voiding it naturally, and yet have an enormously distended bladder. Instances are numerous where large quantities of urine have been removed from the bladder by the catheter where the patient had no such suspicion.

This suggests the question, Is it desirable in cases where there is a large collection of urine in an atonied bladder to remove it suddenly? I believe, as a rule, this is not a good practice, for see what it implies: that a paralysed bladder should at once assume normal dimensions though the distension may have been in existence for days or even weeks. I have known passive hæmorrhage occur into the flaccid sac representing a bladder when it has been suddenly emptied; further,

there is always a serious risk under such circumstances of the viscus becoming septic, and a low form of fever, with dry brown tongue, supervening, upon this comparatively simple operation. I think, as a rule, it is better, where practicable, to empty a distended atonied bladder by degrees, and after each operation to throw in a residuum of some antiseptic fluid. For this purpose we usually employ, in my wards in the Royal Infirmary, a solution of corrosive sublimate (1 in 10,000) which I have found to answer well. Where an atonied bladder with great distension is complicated with a large prostate, which renders catheterism unusually difficult, I should, under these circumstances, and in spite of what some surgeons regard as an inglorious way of entering the bladder, and of some objections that have been recently urged against it, strongly recommend the use of the aspirator with a fine needle. I have seen this answer remarkably well, the urine has been removed by degrees, and the patients have eventually gained the use of their bladders. This method has much to commend it under these circumstances, quite regardless of the possibility or not of passing a catheter by the natural way. The fact that the bladder may be atonied must not be lost sight of in the management generally of persons suffering from debilitating illnesses, and more particularly from various forms of cerebral softening.

The *fourth class*. Cases of sudden and complete retention with obstructing prostates. Our services under these circumstances are usually called into request with some urgency. Either we are already acquainted with the liability of the patient to suffer in this way and are prepared for the cause, or, as is often the case, all we know is that he is a man of advanced years, and our suspicions are consequently aroused as to the nature of the obstruction. Such being the contingency we are called upon to meet, a few words may be said in reference to the selection of instruments adapted for prostatic catheterism. In the majority of patients suffering in this way the enlargement of the prostate has made some considerable progress,

and the effect of this may be to lengthen considerably the canal. A catheter, suitable for an ordinary case of retention arising out of a strictured urethra, may prove to be too short for our present purpose, consequently it is well for us to be prepared with longer instruments than we are in the habit of employing. I was brought up to use under these circumstances what I would now speak of as the long prostatic metal catheters, with a considerable curve. I possess two of these instruments, but they have not been used since I have been in practice. I have found the gum-elastic instruments quite sufficient for my purpose, and all I can say is that it is a long time since I had any difficulty in effecting my purpose with one or other of those I shall bring under your notice. As said

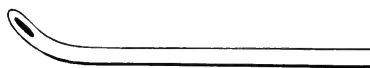


Fig. 52.

before, I never like interfering with that dexterity in the use of a particular instrument which has been acquired by long practice and experience; all I know is, that I should not now select the old-fashioned metal instrument for this purpose. In the hands of those who have not had experience in its use, a considerable amount of irreparable damage may very easily be inflicted on the parts if it is not cautiously handled. I do not regard it as a necessary instrument. In prostatic cases of this kind I usually employ a No. 8 English gum-elastic catheter, measuring sixteen inches in length, and provided with a stylet. If there is any hitch as the prostate is reached, the introduction of the finger into the rectum, or the partial withdrawal of the rigid stylet, will elevate the point of the instrument and enable it easily to slip into the bladder.

The coudé, or French catheter (Fig. 52), where the point is permanently fixed at a suitable angle, is also a useful instrument; it will sometimes glide in almost imperceptibly where the gum-elastic fails.

More recently I have found the whip-bougie, over which is slipped a silk catheter, open at the end and side, as already described, very serviceable, especially when the prostatic urethra is at all tortuous or lobulated. In the selection of instruments for individual cases of prostatic obstruction, remember, as a rule, that that is the best catheter which goes in easiest to the patient. It is impossible to examine a number of specimens of enlarged prostates without recognizing the fact that no single instrument or shape can be of universal application, never mind how skilful the operator may be. He will prove the most successful practitioner who recognises these individualities and shapes his course accordingly.

Provision, however, must be made under this heading for those cases of acute prostatic retention where the practitioner finds that catheterism is impossible. Instances of this kind are rarer than they used formerly to be by reason of the improvement that has taken place in the making of urethral instruments of all kinds. Still cases of obstruction both to the expulsion of urine from the bladder, and to the entrance of instruments into it, will arise. Under these circumstances, I think there is nothing better or safer than the aspirator needle introduced into the bladder immediately above the pubes, the urine is at once drawn off, the patient obtains complete relief, spasm subsides, and in the course of a few hours the instrument that failed passes along the urethra into the bladder without meeting with serious impediment. If, however, catheterism fails, the aspirator may be introduced with impunity again, and again. As a rule, I am not in favour of tying an instrument into the bladder along the urethra unless the difficulty of entrance is extreme, and then it may be resorted to as a temporary expedient. When the surgeon or the patient can pass the catheter, this is to be recommended.

I have had made for me,\* for use with the whip-bougie, some silk catheters, open at the sides as well as at the end, which are

\* By Mr. Wood, 81, Church Street, Liverpool.

fitted with eyelets, so that they may be easily tied in when this

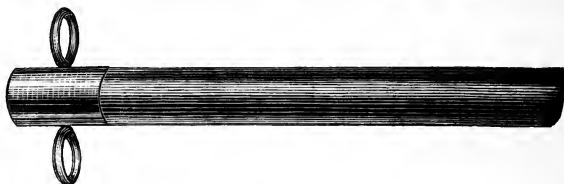
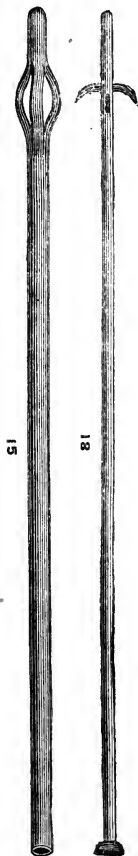


Fig. 53

expedient may become necessary. I generally secure them by means of a suspensory bandage.

For a similar purpose various forms of winged or self-retaining catheters (Figs. 54, 55) have from time to time been suggested and used. As they are not easily introduced in difficult cases of prostatic obstruction, whilst in others, they seem to provoke irritation rather than to soothe, their application will be found extremely limited.



Figs. 54, 55.

I am not in favour of puncture by the rectum, except under an emergency of some kind; if it is only intended as a temporary expedient, it is not so good as aspiration above the pubes; if it is resorted to for affording a more permanent mode of relief, it is open to the objection that you are using the rectum for two purposes. Notwithstanding this, it has proved successful in the hands of some surgeons, who still think highly of it.

It is some years since I introduced a method of tapping the bladder from the perinæum, which has now been practised with success by different surgeons. The process will best be described in the course of the case where it was first adopted.

N. D., aged 84, was admitted into the Liverpool Royal Infirmary at 2 a.m. on November 4th, 1881. My house-surgeon, Mr. Laimbeer, found him bleeding

from attempted catheterism, with a large prostate, and a distended bladder. Recognising the urgency of the case, and finding catheterism impracticable, he emptied the bladder with the aspirator above the pubes. I saw the patient a few hours afterwards, and found he had not passed urine since, and that no catheter could be introduced. His tongue was brown, and he was much exhausted. Later on, I again visited him, when the bladder had become fully distended. I then had him placed under ether, and succeeded in passing a gum-elastic prostatic catheter. The success of this procedure having been demonstrated, I refrained from drawing off more urine, recognising that then either the catheter must be retained, or re-introduced when required; neither of which proceedings I was disposed to recommend. Retaining a catheter in the bladder of an old man, somewhat childish and disposed to remove any appliance if not closely watched, is not easy; and, if accomplished, often ends fatally, from cystitis, pyelitis, and exhaustion. This was a case where, in my judgment, it was wisest to establish a permanent drain; and to effect this in the manner on which I had determined, required a tense, and not a flaccid, bladder.

I had the patient placed in the usual position for lithotomy. Taking a trocar which had been made for the purpose, with a silver cannula, I introduced it in the median line of the perinæum, three-quarters of an inch in front of the anus, and pushed it steadily through the prostate into the bladder, at the same time retaining my left index finger in the rectum for a guide. On withdrawing the trocar, a large quantity of ammoniacal urine escaped. The cannula, being provided with a shield, was secured in its place by tapes much in the same way as a tracheotomy-tube. A piece of india-rubber tubing was attached to the portion of cannula which projected beyond the shield, and conveyed the urine into a vessel placed at the side of the bed. Through this tubing urine continued to dribble. The patient was at once made comfortable by this arrangement, and in forty-eight hours he was up, sitting in an easy-chair—an important matter with old persons. To permit of this, the rubber tubing is shortened during the daytime, the end of it being tucked through a light abdominal belt, where it is compressed by a small pair of bulldog forceps, which are removed when the patient desires to pass urine. He is quite as well as most men are at eighty-four years of age. He gets up daily, takes his food, and sleeps comfortably, either on his back or his side, without any narcotic, and is quite free from any urinary inconvenience.

other than wearing the tube. During the night his sleep is not broken by calls to micturate or pass catheters, as his urine runs off by the tubing as it is excreted; whilst, in the daytime, when he is up and about, his act of micturition practically resolves itself into something equivalent to the turning of a tap. His urine, which had been foetid and ammoniacal, is now nearly normal, the bladder being readily washed out by applying a syringe to the cannula twice a day. On two or three occasions the cannula has accidentally slipped out whilst the tapes were being changed, but has been readily replaced by the nurse. The somewhat enthusiastic manner in which the patient compares his present with his past condition cannot be allowed to pass entirely unnoticed.

The operation was devised much on the same lines I endeavour to take in commencing my lithotomy incision—namely, the selecting of a point in the perinæum where no vessel of importance is endangered. My object in planning the operation was to obtain what I may best describe as a short low-level urethra, adapted to the altered relations of the bladder to the prostate when the latter becomes enlarged, for the purpose of securing the most complete drainage. I should add that, since the tapping, the patient has, as far as we are aware, only passed a few drops of urine by the urethra.

For about six weeks after the bladder was tapped, the patient passed urine entirely through the prostatic cannula. His health rapidly improved, and he was able to go about as if nothing ailed him. Then it was noticed that urine in gradually increasing quantities began to flow through the natural passage, so much so as to lead me to infer that, for some reason or other, the prostate was ceasing to obstruct micturition. On January 28th, 1882, I removed the cannula; the punctured wound healed in the course of a few days, and with this the bladder gradually recovered its natural function and power. The patient now holds his urine for two or three hours at a time, and at night he only requires to urinate twice or thrice. It may be said that the functional symptoms of enlarged prostate have almost disappeared.

The history of the patient pointed to the presence of the usual symptoms of enlarged prostate obstructing micturition, though we could not conclude that complete retention had ever previously occurred. On the day of his admission into the Infirmary it was ascertained by careful rectal examination, both by Mr. Laimbeer, my house-surgeon, and myself, that the prostate was greatly enlarged;

upon this point there could be no doubt. After the tube had been removed, on the date mentioned, we found evidence, from a similar examination, that the prostate had undergone a marked diminution in size; in fact, but little that was abnormal could then be detected. I saw this patient in 1884; he was in perfect health, and free from all urinary troubles.

Here, then, we have a case where a surgical proceeding on an enlarged prostate was followed by its rapid atrophy—a result which, as far as I know, has not been noted before. It may be urged that rectal examination affords evidence as to the state of only one side of the enlargement; it must, however, be remembered that return of the power and function of micturition warrants a conclusion that a corresponding change had occurred in the vesical aspect of the part. Atrophy of the prostate following incision is a result I have occasionally observed in connection with the operation of lithotomy in elderly persons; it has, I believe, happened under similar circumstances to the normal structure. It is probable that the retention of a cannula in the prostate for a period of over two months may have induced changes in the part similar to those observed to follow the use of setons, where wasting of the adjacent tissues takes place.

I record this case, not only as illustrative of a proceeding which is to be recommended as an addition to our resources for the treatment of retention of urine in association with enlargement of the prostate, but as bearing upon the radical treatment of an affection for which little has hitherto been done.

Commenting upon this case, the late Professor Gross remarks:—"When the bladder is chronically inflamed, from enlargement of the prostate gland, tapping may be performed through this organ, as was recently suggested and successfully practised by Mr. Reginald Harrison. . . . My conviction is, that this operation is destined to come into general use in this class of cases, of such frequent occurrence in advanced life, and a source of so much suffering."\*

\* *A System of Surgery*, sixth edition, 1882, vol. ii, p. 703.

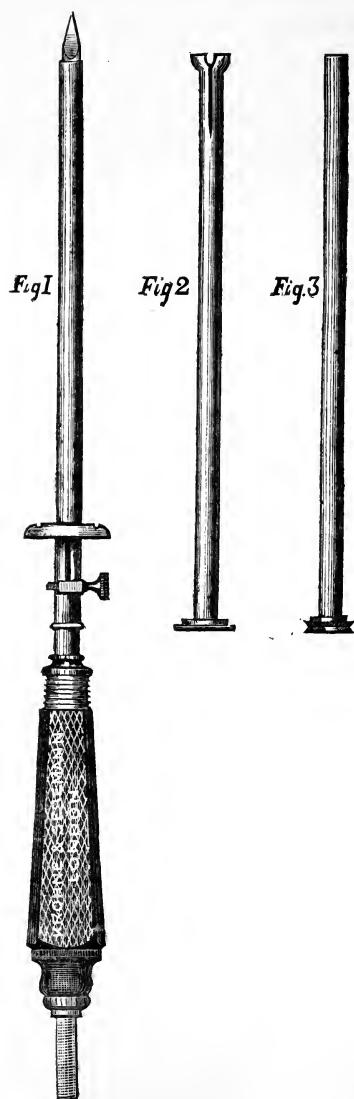


Fig. 56.

Fig. 1 represents the trocar with cannula complete. A piece of india-rubber tubing is to be attached below the collar of the cannula on withdrawal of the trocar, to convey the urine into a receptacle. Fig. 2. Silver cannula, which is introduced in tube of Fig. 1 to form a probe end, and for retaining it. Fig. 3. A plain silver tube with which to clear tube (Fig. 2), in case of its becoming blocked up.

The trocar and cannula employed for this purpose (Fig. 56) have been made for me by Messrs. Krohne and Sesemann. The trocar is hollow, and urine escapes through it by the handle immediately the distended bladder is entered. The shield on the cannula is movable, and can be fixed at any desired position to suit the varying depth of prostate and perinæum. The instrument may be used for other purposes where tapping or exploration is necessary.

It is hardly necessary to observe in the present day that no form of force in catheterism is for a moment warrantable in prostatic obstruction. I shall on a future occasion have to refer to an instance where the catheter was forced through the prostate to relieve retention with, fortunately, very good results. Such a haphazard proceeding is, however, not to be commended. If a surgeon cannot enter the bladder by the legitimate use of a catheter, he had better employ some other access which will prove more under his control and inspection. To force a catheter against an obstructing prostate is to court the complication of a pelvic cellulitis, which speedily brings the case to a fatal termination.

Dr. Simon Fitch, of Halifax, N.S., has advocated the employment of an instrument called the dome trocar (Fig 57) for tunnelling the enlarged prostate.\* The method of using this instrument is described in the following words:—

This instrument is a long dome-trocar, the terminal third curved less than a common catheter or sound; the dome with its fenestra resembles the end of a metal catheter, and is mounted upon a strong steel spring, which adapts itself to the curve of the outer cannula, and when this catheter-end is pushed out, it occludes the point of the outer tube which, for additional security has a slight dorsal protuberance, so that it cannot catch or scratch the lining of the urethra; it is virtually a catheter within a tubular trocar. The mode of operating is this; the instrument, with the dome protruding, is introduced by the urethra, till arrested by the enlarged prostate; when the left forefinger being in the rectum to define and steady the parts concerned, the pointed outer cannula is advanced, and passes easily through the gland into the bladder; then the inside

\* *British Medical Journal*, Feb. 5, 1887.

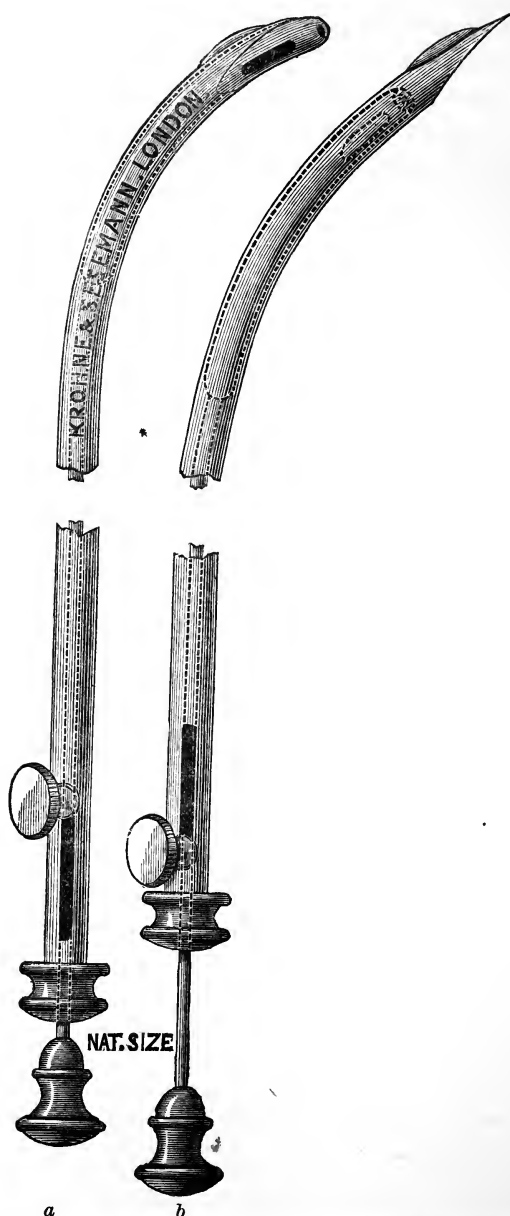


Fig. 57.—Cutting prostatic catheter—*a* with the cutting-point guarded;  
*b* with the cutting-point exposed.

catheter is slid forwards, and enters the bladder with certainty, again occluding the point, and the urine is discharged, as through an ordinary catheter; a thumb-screw now fixes the protruded dome, and the instrument may be retained in the bladder twenty-four hours, or until the perforation is sufficiently patulous, as shown by the instrument moving easily in it; then it may be withdrawn, and a full-sized metal catheter introduced twice a day or oftener, till the new channel is cicatrised and permanently established. This instrument will also be found most efficient for tapping the bladder from the rectum, and for discharging noxious intra-peritoneal fluids, and washing out the peritoneal cavity, through the retro-uterine *cul-de-sac*; and made with a larger curve, will be available in superpubic lithotomy, perforating the bladder from within outwardly, remaining in the wound as a guide for the further steps of the operation. (Full details upon the construction and action of this catheter trocar may be found in the *New York Medical Journal* for Feb., 1882).

Though the instrument in its various forms is an extremely ingenious one, the practice here referred to is not one that I can recommend. If in a case of retention the bladder has to be tapped and the prostate dealt with, I am sure there is less risk and better prospects of permanent benefit accruing by adopting a more direct line of proceeding than the course of the urethra permits of. For other purposes Dr. Fitch's trocar has much to recommend it.

Hæmorrhage from the prostate, after catheterism, ought not to be considerable, occasionally, in spite of our best endeavours, it is more than we like. As a rule, however, it need cause no anxiety. A dose of opium and a contracted bladder are the best safeguards against its continuance. After the sudden retention due to an enlarged prostate has been relieved, the very important question arises as to the future of the case—What are the patient's prospects so far as the power of the bladder is concerned? Is he to look forward from this occasion to the continuance of what has been spoken of as catheter life? or is there a reasonable outlook of the bladder resuming its natural function? To answer this the surgeon will have to regard (1) the patient's antecedents; (2) the circumstances, if traceable, which induced the enlarged prostate suddenly to

close the exit from the bladder ; and, (3) the evidence as to the state of the prostate which is afforded by digital examination from the rectum. Let me say a few words in reference to each of these points from which information may be derived as to the patient's future. First, as regards the patient's antecedents. What has happened before may happen again, *cæteris paribus*, and the inference is that if a patient has suffered in like manner and regained his power of micturition he will do so again. In the second place, the determining cause of the retention may to some extent assist us. If a patient can satisfactorily trace his retention to some temporary cause acting upon his enlarged prostate, such as cold, indulgence in drink, or neglect of the calls of nature, it is probable, having regard to the third consideration, that with the removal, or subsidence of the cause, the power of micturition will again return.

I, however, would lay stress on the examination of the prostate from the rectum as determining our views in reference to the patient's future. When retention occurs in a person with a hard nodulated prostate, where there is evidence to the touch that fibrous tissue predominates largely over the muscular, the power of the bladder seldom returns, the use of the catheter is generally perpetual ; when, on the other hand, the prostate is found soft and yielding to the touch, indicating that muscle is still the predominating tissue, we may, as a rule, anticipate the complete restoration of the function. I attach importance to this distinction, as in most cases of prostatic enlargement complicated with acute retention I have been able to form reliable opinions in reference to the future, relative to the duration of catheterism. This is a point which every surgeon can test for himself.

Before concluding, I will take this opportunity of making a few remarks on self-catheterism, for if the issue of a case of sudden retention is such as to render the use of the instrument more or less continuous, then it becomes the duty of the surgeon to instruct the patient in that act, so that not only may

he provide against contingencies, but be able to meet the requirements of his daily life. Some persons who employ self-catheterism use the soft, flexible, silk and rubber instruments; whilst others prefer one with a little more resistance, such as the gum-elastic and French catheters.

In the selection of an instrument our object should be to obtain one that passes readily, but, at the same time, fulfils conditions as to size and pressure on the surrounding parts of which a medical practitioner is alone capable of judging. Cases of this kind should not be handed over to the instrument maker indiscriminately, any more than persons requiring trusses, spectacles, and other mechanical contrivances. As with the instrument, so with the position of a patient who has to practise self-catheterism; most individuals discover for themselves the readiest posture; one person finds he can only empty his bladder completely when he is standing up: another, that his large prostate offers less obstacle to the catheter as it is entering the bladder when he is recumbent; whereas a third, concludes from experience that the introduction of the instrument along the canal, and the withdrawal of the urine, is accomplished with the fullest degree of satisfaction to himself in all these respects when he is seated at the edge of a chair or a couch, with his various contrivances in the way of vessels and grease ready at hand.

Much that I have said in reference to the selection of instruments and a suitable position, applies also to the frequency with which the operation of self-catheterism should be employed. A man who cannot empty his bladder to any degree spontaneously and is dependent upon his catheter, must be careful in imitating as far as possible what I would speak of as the calls of nature; this, of course, is to a certain extent a relative term permitting of no further refinements. In other instances, where persons void a portion of their urine naturally, but still have more or less of a residuum which is beyond their control, these must to a certain extent be guided by their sensations.

One man finds great comfort from the use of the instrument once in twenty-four hours, whilst others resort to it oftener. So long as the use of the instrument affords comfort to the individual, I am not aware of any reasons for limiting its employment. I have sometimes known patients attribute attacks of orchitis to the frequent use of their instruments, but I am rather disposed to connect this symptom with the manner of its employment than with anything else. A catheter with a cracked or ragged eye, by scratching the prostatic urethra, is often a cause of sympathetic orchitis.

In the *fifth class* of cases, where retention is complicated with advanced forms of prostatic hypertrophy, the indications are to remove the urine either by the catheter or aspirator, and then to consider what can be done with the view of permanently improving the condition of such persons. The latter subject will be discussed in my next lecture.

## TWENTY-SEVENTH LECTURE.

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### ADVANCED FORMS OF PROSTATIC OBSTRUCTION.

*Fifth class.*—Cases of obstructing prostates in their most advanced forms, usually complicated with more or less inflammation of the bladder.

These include cases where there is continued difficulty in introducing the catheter; where hæmorrhage almost constantly attends its use; where the withdrawal of urine is followed by no sense of relief; where there is more or less continuing deep spasm of which the patient is conscious, and where the bladder by the constant presence within it of pus and tenacious mucus is converted into a chronic abscess through which urine percolates. These, as well as some other forms of prostatic disease, which might be included, are practically unrelievable by the catheter, and soon terminate in painful death. Where retention occurs under such circumstances, not only are we required at once to relieve it by the catheter or aspirator, but at the same time to consider the best means of preventing such an occurrence. The latter subject will now more particularly engage our attention. For the relief of such conditions various expedients for establishing a more or less permanent communication with the bladder other than by the urethra have been practised; viz., puncture above the pubes, by the rectum, and from the perinæum, with the retention of a cannula for the discharge of the urine at these several points. Excellent in design, and in some instances in practice too, as these proceedings are, they appear to fall short in not directly dealing with the cause of the obstruction. Two of these measures are open

to objection on the ground that the artificial canals are inconveniently placed as permanent vents, for it would seem desirable that the urethra should, as far as possible, be utilized, and the external opening for the escape of urine be dependent. It was on this ground mainly that I was led to practice a perineal puncture through the hypertrophied prostate, as described in a previous lecture.

On further consideration of the various operative measures that had been applied to these exceptional instances of enlarged prostate, it appeared to me possible that some of them would permit of further adaptation for the purpose of directly dealing with the cause of obstruction. The practice introduced by Mercier of dividing the prostatic bar by cutting instruments passed along the urethra seemed to want precision and sufficiency in execution, which could alone render it safe as well as efficient. Imperfect in some respects as this operation appeared, I found amongst other operators my friend, Dr. Gouley, of New York, was practising it with good effect. Mr. Swinford Edwards has also recently testified to its value in certain cases.\* The operation consists in introducing a prostatome and dividing, or rather, as it seems to me, punching out, a portion of the prostatic bar. This is an instrument (Fig. 58) which was given to me when I was last in New York by Dr. Gouley, who had it made for this purpose as well as for estimating the thickness and character of the prostatic bar.

Mercier's operation of internal prostatotomy seems to me to be applicable to those cases alone where the degree of obstruction as determined by actual measurement is of a limited and definable nature. Under these conditions I have practised it in a few instances with considerable success, which has not been only of a temporary character. With the view of extending these limits of prostatotomy, it appeared to me that by combining Cock's operation for opening the membranous urethra with Mercier's for dividing the prostatic bar in a somewhat

\* *The Lancet*, July 11, 1885.

modified form, as will presently be described, it would be possible to obtain precision with safety. Such an operation was suggested by the late Mr. Guthrie, but I cannot find that he ever tested it in practice. The want of anæsthetics probably interfered with the progress of this as of other departments of surgery.

Before describing the operation and after-treatment practised, I would mention a method of examination which often furnishes very valuable information. It consists in reversing the long sound, and introducing the index-finger of the opposite hand into the rectum, by depressing the prostate towards the bowel (as shewn in Fig. 42, p. 276), an approximate estimate can be made of the form and thickness of the bar. After some experience of different plans of measurement, I prefer this to any instrument, such as the prostatometer (Fig. 58) of Gouley.

The necessity for prostatotomy having been determined by the symptoms presented in each case, as well as by physical examination, I will proceed to describe more in detail the operation and after-treatment employed. It consists in opening the membranous urethra from the perinæum on a guide, and introducing the finger within the prostatic urethra. The obstructing portion is then divided in the median line, partly by incision with a straight probe-pointed knife, and partly by divulsion with the finger or large-sized bougie until the access to the bladder is felt to be free. In some instances I found it better to make the prostatic incision from within outwards with a curved probe-pointed bistoury. Unless this is done the division may be incomplete. In doing this operation it is not desirable to make an opening larger than will admit the index finger from the



Fig. 58.

perinæum into the bladder, such an opening is completely filled up by the drainage tube that is subsequently used, and consequently but little risk of hæmorrhage need be entertained. The drainage tubes I am in the habit of employing after section of the prostate has been effected are gum-elastic, with a special provision for the more thorough drainage of the bladder than has hitherto been attempted. This consists in the employment of a double tube, as shewn in the sketch. (Fig. 59.)

When the patients get up, as they usually do about three weeks after the operation, the bladder drainage tube is connected with a piece of rubber tubing about two feet long, terminating in a small stop-cock; the perinæal tube is retained in its place by a T bandage, whilst the end of the tubing which leads from it and conducts the urine is looped up into an ordinary belt, which the patient wears. When he requires to pass urine all he has to do is to let down the end of the tubing from his belt and turn the stop-cock. I have had patients up and about with this arrangement for passing water within ten days from the operation. I do not find that the urine leaks through the wound by the side of the tube, if the former is properly made and the apparatus correctly adjusted. Where the perinæal incision has been made rather larger than the drainage tube I now partially close it with sutures so as to make the fit more accurate.

I attach considerable importance to the prolonged use of the drainage apparatus, as my object is to render the section of the prostate not a temporary one, as after a lithotomy where no such provision is made, but permanent. Hence I am in the habit of retaining these tubes for six, eight, ten, or twelve weeks. If after such periods, on removing the tube, I find that a catheter can be made to enter the bladder easily along the natural route, or if, as sometimes happens, urine forces its way in spite of the perinæal tube along the natural passage, I regard these as indications that the object in view in the retention of the drainage tube has been obtained. The regular use

of the bougie is continued until the perineal wound has soundly

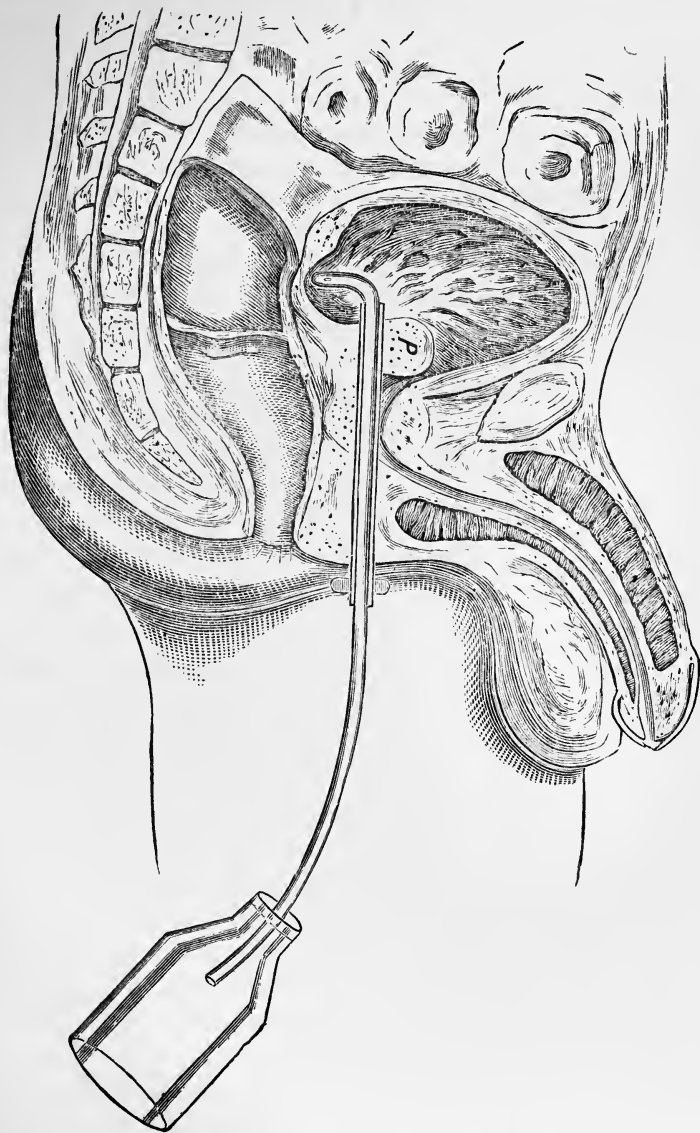


Fig. 59.

healed, a process which usually takes place rapidly, and leaves

but little mark. As a precautionary measure, patients are enjoined to continue to use the bougie occasionally.

I will briefly narrate the particulars of two cases illustrating not only the symptoms to which the operation is applicable, but the results obtained in other instances which have come under my notice during recent years.

D. E., aged 68, a waiter, came under my care at the Royal Infirmary, during 1883, with an atonied bladder and retention of urine from a large prostate. There had been great difficulty in passing the catheter, and much blood had been lost. The patient was very childish in his habits, and it was found impossible to make him retain a catheter. After three weeks trial of various plans of treatment without avail, I performed the operation described, and divided a prostatic bar of considerable thickness. No further hæmorrhage followed the operation, cystitis disappeared, and the urine became normal. The patient was able to get up and go about in ten days, his urine being discharged at will by turning the tap connected with the drainage apparatus. The drainage apparatus was used for eight weeks, when it was noticed that, in spite of the tube, a certain quantity of urine made its way along the urethra. The tube was then withdrawn, and the perinæal wound rapidly closed. This patient has never had any further impediment to the natural escape of urine along the urethra. He has been frequently examined before the clinical class at the Royal Infirmary, and though the prostate remained large, there was no difficulty in micturating, or in passing the largest sized catheter into the bladder. He could retain urine for four hours, the bladder acquired its natural power of expulsion, and there was no residual urine. Six months after the operation, the patient had a paralytic seizure, from which he has not recovered, but it has not been found necessary to resort to catheterism. No more unfavourable case could have been submitted to operation, but the results obtained more than justified the course that was adopted.

In August, 1885, I met a man (J. B., aged 73) in the street, carrying a heavy load on his back, who I recognised as an old patient of mine, upon whom I had performed perinæal prostatotomy. I questioned him, and found that he was quite

well, and had never used the catheter since he left my care. The circumstances of this case are briefly these :—

The patient was sent to me by Dr. A. Barron, he had a large prostate, and required constant catheterism for retention ; the instrument was difficult to introduce, and serious hæmorrhage frequently took place. In three weeks he was treated by me in the Royal Infirmary in various ways, but with no benefit. His desire to urinate and his strainings were incessant, and nothing appeared to give any relief. In February, 1884, he underwent perinæal prostatotomy, and wore one of my tubes continuously for seven weeks ; the perinæal wound closed, and he shortly left the Infirmary with the result I have already mentioned, I have still more recently had an opportunity of passing a full sized bougie for him, and can detect no obstruction. This man's present condition is a remarkable contrast to what it was previously.

In June, 1883, I reported \* one of my earliest cases, where I had thus operated. The patient remained under observation for some time afterwards ; that is to say, for a year after he had discarded his catheter.

In offering an explanation of the results obtained, I think we have it, not only in the means which are adopted to render the section of the prostate permanent, but further, something is due to the introduction into the prostate of no inconsiderable quantity of shrinking or cicatricial tissue. Whatever the explanation may be, my cases justify a conclusion that much permanent good may thus be done in the most hopeless instances of this disorder.

In my experience of prostatotomy, both external and internal, I have not found that the prostate is a part which is particularly prone to bleed when incised ; if it were, I think I should have discovered it before now. If the knife is allowed to deviate from its proper course, to invade tissues outside the prostate, in which may be found many veins of considerable size, a good chance of free venous bleeding is then incurred.

\* *British Medical Journal*, June 9, 1883.

The same applies to lithotomy, if your lines are correct and precise, bleeding need not be feared.

It is only right in connection with a proceeding which I have been amongst the first to advocate and practice that I should turn for a moment to the other side of the picture, and refer to what may be regarded as those cases where I have failed to obtain the results desired. I have now operated over twenty times—a number sufficiently large for drawing some deductions which seem to me of value in connection with this subject. Not a single instance has yet happened where I either regretted having done the operation, or directly or indirectly connected the death of the patient with the proceeding. In two instances only, so far as I know, did the patients die; one three weeks after the operation, and the other four. Both lived longer and more comfortably than they would otherwise have done, and had nothing to regret in what was undertaken for them. Both patients showed after death a condition of the urinary organs beyond repair; both showed the damage that long-continued back-pressure of obstructed micturition is capable of effecting, and to this extent was a cause for regret that more perfect mechanical measures for relieving this back-pressure had not been earlier applied. Both of these cases, however, served to teach how the mechanism of median prostatotomy, as already described, might be improved, for both shewed that in some instances the form of the prostatic bar was such as to render it well-nigh impossible to divide it adequately, as in lateral lithotomy, from before backwards; and that it was necessary sometimes to divide from within outwards. Only in these two instances, and a third, where I removed almost the whole of a carcinomatous prostate, did death follow, so far as I can ascertain, either shortly afterwards or more remotely, any of the proceedings referred to under the headings of prostatotomy and perinæal drainage.

In connection with the subject of internal prostatotomy, the following cases which came under my notice are of interest:—

An elderly gentleman had long suffered from a large prostate with residual urine. There was some difficulty in getting the catheter into the bladder through the prostatic urethra, to do which the handle of the instrument had to be depressed very much. As other symptoms of vesical irritation showed themselves, he was on my advice sounded for stone. This operation was difficult, very painful, and followed by free and continuous hæmorrhage. Cystitis supervened, and the patient was exceedingly ill for about ten days. Three months after this he came to see and thank me for the operation I had advised, for though no stone had been discovered, he had since passed water easily, and had not required to use the catheter. A strong suspicion occurred to

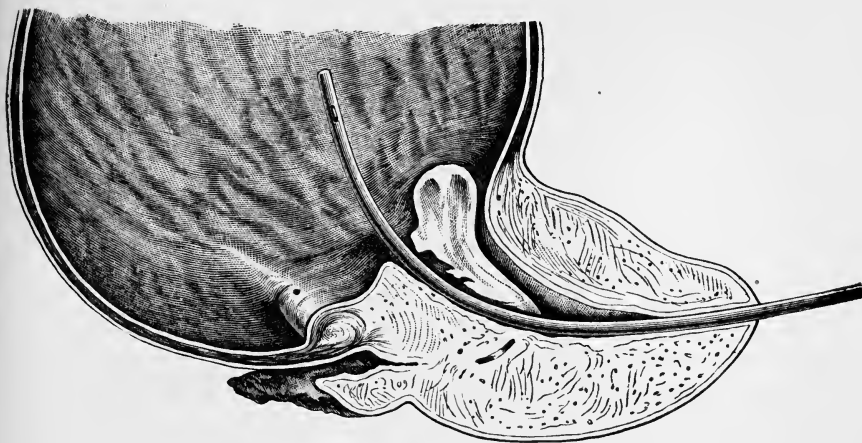


Fig. 61.

me as to what had been done by the operation of sounding which was followed by such serious symptoms. I passed him a full-sized catheter, without either difficulty or pain, but what was still more significant, without finding any residual urine. How was this remarkable change to be accounted for? The conclusion I came to and noted was that not only had the obstructing prostate been punctured, but the bridge of tissue above the false passage had either been torn across, or had subsequently sloughed. How easily this could have happened is shown by a reference to Figs. 61, 62.\* My friend, the practitioner who attended this patient, at all events got the credit,

\* Drawn from a specimen discovered *post-mortem*.

and deservedly so, of having cured his patient, though, as the latter remarked to me, "the operation was pretty severe." Had an anæsthetic been used, it is probable that the patient would never have been fully conscious of the process by which, somewhat haphazardly, he had reaped so much permanent good.

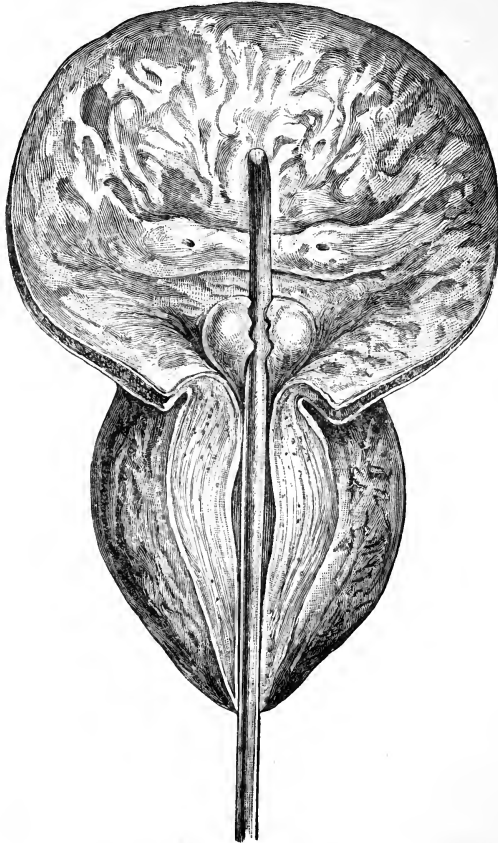


Fig. 62.

The other instance is as follows :—

Some years ago, I was asked by the late Mr. Long to see with him an elderly gentleman who was blanched from profuse hæmaturia. Six days previously, a large metallic prostatic catheter had been passed

for him with pain, difficulty, and hæmorrhage. In consequence, more especially of the profuse and continued bleeding, Mr. Long had been called in. Every means was adopted to arrest the bleeding, but failing these I was asked to do an exploratory operation, with the view of getting at the bleeding spot, which was deemed to be within the prostatic urethra. I performed median perineal urethrotomy, and my finger, on entering the prostatic urethra, passed on into the bladder through a hole at the base of the projecting portion of the part, which we concluded had been made by the prostatic catheter. As my finger was pushed in, a bridge composed of sloughy prostatic tissue broke down, thus rendering the opening into the bladder completely free. There was some considerable oozing of blood from the broken down prostate. The bladder was washed out and freed from clots, and an old-fashioned umbrella-tampon introduced, by means of which the wound was carefully plugged. No further hæmorrhage occurred, urine escaped through the tube, and the latter was not removed for a week, when a fresh one was substituted. Though the patient remained in a critical condition for some weeks, he made a good recovery. For two years I frequently met him, and knew that he remained well. I heard of his death a short time ago from old age, without any return of his urinary troubles. Partly by the catheter, and partly by subsequent sloughing, the obstructing prostate was so completely removed that I was not surprised at the result just mentioned.

I think I may claim these two cases as illustrations of prostatotomy, though accidentally performed, yet ending in complete and permanent cure. I wish I could say the same for other cases of forced catheterism which have incidentally come under my notice.

It sometimes happens that more or less of the mass constituting an hypertrophied prostate undergoes inflammation and suppuration of an acute kind. A patient who has been in the habit of using his catheter daily takes a chill, his bladder becomes unusually irritable, there is much bearing down pain, and the use of the instrument is intolerable. If an examination is made by the rectum the part is swollen, hot, and exquisitely sensitive. After a few days suffering of this kind, relieved to some extent by warmth and anodynes, the patient

has a chill or rigor, followed by the sudden discharge of stinking urine, containing a considerable element of pus ; then relief comes, and convalescence takes place. I have seen several instances more or less corresponding with this description. In some permanent benefit has followed, no doubt owing to the destruction of a certain amount of hypertrophied prostatic tissue, and the subsequent obliteration and contraction of the abscess cavity. When there is reason to believe that pus has in this way been discharged, the bladder should be carefully washed out twice a day with some bland antiseptic fluid until the urine becomes normal. In this way good has come out of evil.

*Sixth class.*—Cases of enlarged prostate complicated with stone and tumour will be noticed in connection with the latter disorders.

## TWENTY-EIGHTH LECTURE.

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### ON PROSTATECTOMY, OR EXCISION OF PORTIONS OF THE ENLARGED PROSTATE—PROSTATECTOMY FOR CARCINOMA OF THE PROSTATE.

No review of the surgical treatment of the enlarged prostate at the present time could fail to include what has been done, either accidentally or designedly, to afford relief by the removal of more or less of the hypertrophied mass. Though such a notice must necessarily include some instances where an operation of this kind included malignant tumors involving the prostate and obstructing micturition, it will be convenient to allude to them in this place.

My attention was first directed to removing portions of the prostate through incisions made from the perinæum by the occurrence of the following case, which formed the basis of a paper \* upon the subject generally :—

W. B. H., a Custom-house officer, aged sixty-seven, was admitted into the Royal Infirmary under my care on September 2nd, 1881, having been referred to me by Dr. Samuels. He had been suffering from symptoms of stone for seven years. I sounded him and made out that his bladder contained a large oxalate of lime calculus ; further, that his prostate was enlarged. On September 5th I performed lateral lithotomy ; on seizing the stone I found it was so large that I made a bilateral section of the prostate, a course I was prepared for, and one which I have successfully adopted on two previous occasions where I had to remove hard stones, weighing over two ounces. Though this extension of my deep incision gave me additional room

\* *Royal Med. Chir. Trans.*, vol. lxxv.

for extraction, I recognised that the enlarged prostate still remained an obstacle. As a portion of the prostate seemed loose and disposed to come away, I enucleated it with my forefinger, and slipped it out, when I was able to remove the stone from the bladder without force. There was no bleeding worth mentioning either at the time of or after the operation. The patient made a good recovery and left the Infirmary on November 5th. There was nothing to remark about the temperature during the whole of the treatment. The tumour removed was about the size of a walnut, and it will be seen that it was almost divided into two portions by the incision into the prostate. In structure it may be described as an adenoma, analogous to what is commonly observed in the breast, and corresponding with the description given of these growths by Sir William Fergusson. The stone was an unusually large specimen of oxalate of lime, covered with small spines, some of which were broken off by the forceps during extraction. It weighs two ounces and five drachms.

By the kindness of my colleague, Mr. Bickersteth, I am enabled to give the particulars of an unpublished case very similar in many respects to that which I have related.

A country gentleman, aged sixty-three, had suffered from symptoms of stone for fifteen years. Mr. Bickersteth, considering that it was a case for lithotomy, performed the lateral operation. Finding as he had anticipated that the stone was large, he extended the deep incision and made a bi-lateral section of the prostate; this enabled him to make out that in addition to the calculus he had a large growth connected with the prostate to deal with. After extracting the stone with the forceps he shelled out with his index finger a mass about the size of a hen's egg, which proved on examination to be an adenoma of the prostate, not a true hypertrophic growth; the stone weighed nearly two ounces and a half. The patient made a good recovery, and to the present date remains perfectly well. The operation was performed on October 21st, 1878.

In 1870 the late Sir William Fergusson drew attention to the subject of lithotomy in connection with enlarged prostate,\*

\* "Observations on Lithotomy and on certain cases of Enlarged Prostate." *The Lancet*, Jan. 1, 1870.

and narrated a case where, in a patient eighty years of age, after removing the stone by lithotomy he extracted the lower part of the prostate with the finger as readily as if it had been a stone. The patient not only recovered from the operation but never showed any further signs of prostatic irritation. The paper to which I have referred concludes with the remark: "I have thus ventured to put on record what some of my professional brethren may have hesitated to do from a fear that they may have been guilty in their operations of perpetrating some rough mechanism not in accordance with that nicety of manipulation which is thought so essential in the performance of the master handiwork in surgery—lithotomy."

Mr. Cadge\* has reported a case where he removed during a lithotomy, in the forceps between the joint of the blades, three masses which were found to be fibrous outgrowths of the prostate. In commenting upon this case, Mr. Cadge says: "In about two months the wound was perfectly healed; there is incontinence, which may be in a great part due to the removal of the prostatic tumour, but it must be remembered that it also existed before the operation. It has happened to me twice before to remove small fibrous tumours of the prostate gland during the operation of lithotomy and apparently without harm to the patient."

More recently Dr. C. Williams, of Norwich, † has reported a case where he removed, accidentally, between the forceps an enlarged middle lobe of the prostate. In three weeks the patient was reported as recovered, having seldom to micturate more than once in the night.

These illustrations show that two kinds of growth have been removed from the prostate in the course of lithotomies, namely, (1) isolated tumours, resembling adenomata, the term used by Sir William Fergusson, and (2) ordinary outgrowths or hypertrophies, such as we are most familiar with, as affecting the

\* *Trans. Path. Soc.*, vol. xiii.

† *British Medical Journal*, June 15, 1878; and Nov. 14, 1885.

middle lobe. From the illustrations I have given I submit we may draw three conclusions at the least.

*First*, that lateral cystotomy may be practised in certain cases of enlarged prostate which are attended with symptoms producing great distress with the view of exploring and if possible of removing the growth.

*Second*, that in all cases of cystotomy for calculus where the prostate is found to be enlarged, a careful search should be made with the finger, with the view of effecting the removal of the growth should such be found practicable.

*Third*, that in determining the selection of lithotomy or lithotrixy in a case where stone in the bladder is complicated with enlargement of the prostate, regard should be had to the possibility of removing both of these causes of distress by the one operation, namely, by lithotomy.

Further, the cases I have recorded seem to indicate the mode in which these growths may best be removed when met with, either in the course of a lithotomy, or a cystotomy performed for the purpose. The presence of isolated growths in the prostate can be ascertained when the part is opened into, by exploration with the finger; for, as Sir William Fergusson observed, "as the finger passes towards the bladder, the sensation is as if its point glided through several rounded bodies in the substance of the gland, which are but slenderly in contact with each other." Of this sensation I have been conscious in more than one lithotomy I have performed in elderly persons. Thus discovered these growths may then be enucleated by the finger as I have already endeavoured to demonstrate.

When the growths assume a more pendulous form, as we frequently see when the third lobe is hypertrophied, though they may be detached with the finger or the lithotomy forceps, as occurred in Dr. Williams's case, I think a more precise and possibly safer proceeding might be adopted.

I refer, after the bladder has been opened and the growth explored with the finger, to the including of the tumour in

some simple form of *écraseur* by which it could be clearly detached without risk of hæmorrhage, just as is sometimes done in the case of a uterine polypus. In alluding to such a proceeding, it is with the view of making preparation for what may be necessary when undertaking the operation of lithotomy in a person who is known, or suspected, to have a large prostate, the obstructing portion of which it may be desirable to remove.

In reference to the precise method of removing a prostatic outgrowth that might be discovered either in the course of a lithotomy or in an exploratory operation specially undertaken for this purpose, Dr. Gouley remarks, after describing a median perinæal section for the ablation of median prostatic outgrowths : \* “the surgeon should then endeavour to give permanent relief by a procedure which will probably not add greatly to the dangers of the preceding steps. He should first explore the prostate through the artificial opening, and if he discover a median outgrowth, or isolated tumours, he should dilate the prostatic sinus, or incise the prostate laterally, and enucleate the tumours, or, if there be a median outgrowth, excise it; but the better plan is to remove it by means of a small wire *écraseur*, and then to introduce a large-sized soft vulcanized india-rubber catheter, and retain it in position for two or three days.”

Writing to me in 1883, Dr. John Ashhurst, of Philadelphia, says : “I have lately had occasion to remove an enlarged ‘third lobe’ after median lithotomy for a broken catheter in the bladder, with the effect of giving the patient entire relief.”

In a recent volume of surgical reports † I find the following reference to this class of operations :—

A man, aged sixty-five, who had previously been operated on for calculus vesicæ, was admitted with fresh symptoms of calculus. Median lithotomy was performed; the prostate was found to be very greatly enlarged, and was therefore removed. The patient made a

\* *Diseases of the Urinary Organs*, by Dr. J. W. S. Gouley, New York, 1873.

† *St. Bartholomew's Hospital Reports*, 1885.

good recovery. A year later he died after another operation for removal of a calculus. A small cavity marked the site of the excision, a thin capsule of prostatic tissue alone remaining.

Though in the following case the operation was undertaken for a malignant enlargement of the prostate, it will be best to refer to it in this place :—

J. B —, aged sixty-four, came under my observation in August, 1882. His chief symptoms related to hæmaturia and frequency in micturition. The patient had up to nine months previously enjoyed good health. There was no history either of syphilis or tubercle. Two months ago he noticed that his left testicle became swollen. This was strapped, when the swelling passed to the right one, which was considerably enlarged on his admission to the Infirmary. On exploration by the rectum the prostate was found somewhat enlarged, indurated, and nodulated. On examination with a sound some obstruction was revealed in the prostatic urethra, but neither stone nor roughness within the bladder could be detected. He passed urine every two hours or oftener both by day and night, and the urine was largely mixed with blood. Nothing like a villous structure could be detected after careful examination with the microscope of some shreds contained in the urine. The right testicle was somewhat enlarged, but uniformly so. No glandular enlargement could be detected. All kinds of treatment were tried ; but though matico diminished the quantity of blood in the urine, yet the extreme irritability continued, under which the patient's health was rapidly giving way. Under these circumstances I determined to explore the prostate and neck of the bladder with the finger. On October 25th I opened the membranous urethra as for the median operation for stone. On exploring the prostate I found a solid mass projecting into the urethra and occupying the neck of the bladder. This, with some little trouble and with the assistance of Mr. Rushton Parker, I succeeded in enucleating tolerably completely, though a hard cord-like band in the roof of the prostatic urethra was only imperfectly scraped away with the finger. The mass removed was about the size of the last phalanx of my thumb, and was evidently a new and rare growth. The exploration of the bladder was not as complete as I could have wished, notwithstanding the viscus was well pushed down towards my finger from above the pubes. The removal of the tumour was not attended

with any serious hæmorrhage, it not being necessary to tie a vessel. The patient suffered very little from the operation. As the urine now passed entirely through the wound, the patient was able to enjoy what he had not had for many months—namely, uninterrupted sleep. On the third day after the operation the urine was clear from blood, and remained so for ten days, when it again returned in a small quantity, and finally disappeared. On December 1st the patient was able to leave the Infirmary, the perineal wound having almost entirely healed; he had not complete control over his bladder.

On December 15th he returned to the Infirmary for relief, by reason of some preputial irritation which had been caused by the use of a rubber urinal. The dresser's report is as follows :—" The urine is free from blood, and all comes by the urethra. Dec. 20th : A rubber catheter was tied in the bladder for a few hours daily.—Jan. 8th, 1883 : The patient is in much the same condition, but he is able to retain his urine for about half an hour. He was measured by Mr. Reynolds, the surgical instrument maker, for a urinary truss, made after Mr. Harrison's directions, with the view of providing against the incontinence.—12th : The patient was fitted with the truss yesterday afternoon. It consists of an ordinary leather covered truss-spring, terminating in an ivory ring, well padded, through which the penis is passed, the object being to exercise steady pressure on the urethra immediately below the arch of the pubes. It was found that this apparatus completely restrained the escape of urine and enabled the patient to get about his business with comfort. Before leaving the Infirmary on Jan. 24th, it was noticed that so effectual was the truss in controlling the escape of urine, that a slight leakage through the perineal wound took place, which required some few applications of nitrate of silver. On the 19th, Mr. Harrison introduced the patient at his clinical lecture for the purpose of demonstrating the use of the urinary truss and in illustration of his remarks relating to the case." This patient lived comfortably for fourteen months after the operation. He had no recurrence of the hæmorrhage, and partially resumed his occupation as a stevedore ; then the glands in his left groin began to enlarge extensively, and in two months more he died.

I am indebted to my dresser, Mr. Cooke, for the notes of this case, and to Mr. Paul for the following report of the tumour :—

“The piece of tumour hardened for microscopical examination was the size of a small filbert, and was rather less than one-half of the whole bulk of what was removed. It was softer and more fleshy in appearance than normal prostate, and was plainly to the naked eye a new growth. Microscopically, the portion examined consists of prostatic tissue, infiltrated with carcinoma, except along one margin, where the normal prostatic structure is unaltered. The growth is spreading both by direct extension along the gland tubes, and as a cellular infiltration of the stroma. The carcinoma is of the acinous variety, the general appearance resembling an ordinary scirrhus of the breast. The cells are from two to three times the size of a pus cell, and some contain more than one nucleus. Those next the basement membrane are in places elongated and more regularly arranged. The alveolar stroma is very rich in cells, and in many places shows a number of non-striated muscular fibres. The growth may be considered to have originated in the prostate, and not to have spread to it from the bladder, as it is very doubtful if an acinous variety of carcinoma ever originates in the latter.”

Such are the chief features, clinical and histological, of a case of more than usual interest and rarity. Though the operation which was performed did not cure the patient, it was the means of prolonging life, and rendering its continuation less distressing than it previously was. That the growth was of a rare kind must be evident to all who have any acquaintance with the enlargements and tumours to which the prostate is liable. That the proceeding adopted was the only means of affording relief I have not the least doubt, nor was the risk incurred a great one to run. No condition can be more distressing than that of malignancy associated with difficult micturition, hæmorrhage into the bladder, and the constant catheterism that these entail. If my incision in the case now brought under notice had only temporarily relieved these symptoms, the continuance of which could only have brought about a speedy termination, without permitting the removal of the growth, even then something would have been gained by it. The means successfully employed for providing against the incontinence which resulted

is also worthy of attention, as the principle might be extended to other circumstances. I have often noticed how slight a pressure applied over the urethra at the root of the penis will effectually stop micturition. The application of this principle by a truss suggested itself to me as being a likely, if not an entirely novel, means of affording the remedy that was desired.

## TWENTY-NINTH LECTURE.

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### ACUTE AND CHRONIC INFLAMMATION OF THE BLADDER— ATONY — CYSTITIS IN WOMEN.

CYSTITIS or inflammation of the bladder is an affection of such frequent occurrence, at least in its more chronic degrees, that it behoves every one who has to do with surgery or general practice to make himself well acquainted with it. It is one of those disorders which is sure to require some mechanical management, such as the use of the catheter or the washing out of the bladder, and, therefore, it much depends for its successful treatment not only upon the manual skill of the practitioner, but also upon his judgment in the selection of the necessary applications.

Cystitis rarely occurs as an idiopathic disorder, but commonly in association with some other derangement of the urinary system. The acute form of cystitis is in the present day extremely rare. Formerly it was frequently seen as a consequence of the old operation of lithotrity, where, after each crushing, the rough fragments of stone were left in the bladder and excited inflammation. Here this complication often proved so rapidly fatal as to seriously compromise the operation of lithotrity in the judgment of those competent to form an opinion. The important improvement introduced by Bigelow, of crushing and removing the fragments of stone by suction at one operation, disposed of the most frequent cause of acute cystitis that we then had to deal with. This topic will be again referred to when I come to speak of the treatment of stone.

The few cases I have seen of acute cystitis have been

traceable to injuries involving the pelvis and bladder; to the improper use of instruments; to the introduction of foreign bodies of an irritating nature into the bladder; and lastly, to the rapid decomposition of putrid urine.

When the bladder is acutely inflamed we have all the local and general symptoms more or less prominent of an active inflammation of a vital organ. There is supra-pubic pain and tenderness, often running into general peritonitis; there is vesical and rectal tenesmus, and the process of squeezing out the scanty high-coloured urine is extremely distressing. Sometimes there is retention, but not always. The urine that is discharged is often very remarkable in appearance, resembling thin prune juice, and evidently containing blood and mucus intimately mixed with the excretion. Under the acute cystitis of prolonged retention with decomposing urine, I have seen as a result, both in men and women, what I believed to be the whole mucous coat come away in detachments as a sloughy mass. It is only quite recently that I drew attention to a cupful of shreds and masses of a soft parchment-like material which had been passed by a male patient under observation in this way, who had suffered severely from cystitis following retention of urine.

In the treatment of this condition we shall do well in the absence of obvious causes of inflammation, as injuries and such like, to have an eye to the possibility of a foreign body having been introduced into the bladder. In the most acute case of cystitis I have seen it turned out that the patient had passed a very irritating kind of grass head into the bladder, the stalk of which, in a few hours, had penetrated the fundus of the viscus and made its way, together with the contents of the bladder, into the belly. If there is a cause for the cystitis that can be removed this will be the first indication to be fulfilled. In injuries there is often something to be done, but this will be considered later on.

In the acute form of cystitis, reliance will chiefly be placed

in warm soothing applications about the part, with anodynes, either local or general. A few leeches applied to the perinæum generally remove that dreadful feeling of tension about the neck of the bladder which is often complained of. Demulcent drinks and febrifuges are also indicated. I do not know anything which oftener gives relief than introducing a soft catheter and running into the bladder just as much warm water as can be tolerated with comfort. This may be done frequently, and is always grateful to the patient. But I will now pass on to notice those forms of cystitis of common occurrence, which we meet with as complications of other urinary disorders. We shall recognize the following circumstances under which they occur :—

First : As produced by the extension of inflammation from some other part, as in gonorrhœa. This may be called metastatic cystitis.

Second : As a consequence of obstructed micturition, as in stricture, or hypertrophy of the prostate—the cystitis of obstruction.

Third : As produced by an irritant in the bladder, such as a calculus or a growth—the cystitis of direct irritation.

It is not uncommon to find cystitis, in various degrees, occurring as a consequence of gonorrhœal urethritis, it being generally considered as an extension of the inflammation to the mucous membrane of the bladder along the urethra ; like other metastatic inflammations, I have noted that the primary disorder often abates as the change in locality takes place, as if the force of the action were concentrated on one spot.

In the slighter forms of cystitis resulting from gonorrhœa, or when provoked by such causes as exposure to cold, we have this condition indicated by frequent micturition, and urine more or less loaded with mucus. In the severer forms, in addition to constitutional fever, the bladder is intolerant of the presence of urine within it, as indicated by the extreme frequency of micturition, and the distress and tenesmus pro-

duced by the contractile power necessary to expel it. The urine becomes purulent, and a discharge of blood not infrequently terminates the act of its expulsion.

I have observed the greater liability to cystitis and bladder irritation, as a complication of gonorrhœa, at seasons of the year when sudden changes in temperature are apt to occur. Hence the importance of providing against this by suitable clothing and avoiding exposure to keen winds.

The treatment of this kind of cystitis must be in correspondence with the degree of inflammatory action that is taking place. In the milder forms, where the term "irritation" best describes the extent to which the bladder is implicated, the suspension of any kind of abortive local treatment, so far as the gonorrhœal discharge is concerned, is at once necessary. Rest, in the recumbent position, and soothing applications in the form of hot opiate fomentations and sedative suppositories must be substituted. Of all the demulcents I have been in the habit of prescribing, I find the decoction of the *ulmus fulva*, or slippery elm, in combination with the *succus hyoscyami*, affords the speediest relief.

In cases of gonorrhœal cystitis, where the disorder has a tendency to become chronic, frequency in micturition and purulent urine remaining after the more acute symptoms have subsided, I have found benefit from the use of *copaiba*, or the oil of yellow sandal wood: these remedies are however not well borne where there is general febrile disturbance.

Passing to the cystitis of obstruction, we shall find that this presents itself to our notice as chronic and sub-acute.

The *chronic* is usually seen in cases of enlarged prostate, and in some of the commoner varieties of organic urethral stricture. The chronic cystitis of the enlarged prostate is due not alone to some urine remaining in the bladder, but also to the direct irritation produced by protruding masses of the hypertrophying part. This irritation leads to an excess of mucus being thrown out, and to its accumulation with a

residuum of urine in the most dependent portion of the viscus. The result of this is decomposition of the urine and the evolution of ammonia. By the constant presence of such compounds the bladder becomes inflamed, intolerant of its contents, liable to small hæmorrhages and quite incapable of performing its natural function with any comfort to the patient. Going a stage further on, the dilated ureters, and perhaps the pelvis of the kidneys, share in these changes, and thus serious complications are almost imperceptibly added.

In certain cases of stricture much the same sort of thing occurs, though for obvious reasons the amount of the vesical mucus is not so great as in the former illustration; still it is sufficient to produce similar changes in the urine. This excretion is rendered alkaline and ammoniacal, the bladder becomes irritable, the patient is constantly straining to emit a few drops of urine, and in like manner with the cystitis of the large prostate, the ureters and kidneys may eventually become involved. The indications for treatment are tolerably clear. Remove the cause and the consequences will subside, either spontaneously or with the assistance that art can render. In the case of the large prostate this cannot be always done to the extent we could desire, at all events in those instances where the growth has been of a steadily progressing character. The obstruction, if it cannot be removed, may be largely remedied by the use of the catheter. How and when the catheter is to be used must to a large extent be left to individual experience and discretion.

Where the cystitis is due to the obstruction caused by a chronic organic stricture, it will be found to decline spontaneously as the stricture yields to the appropriate treatment. It is interesting to notice this in some cases of this kind of obstruction which are being submitted, I will say to gradual dilatation. Week by week as the contraction yields to the pressure of the instrument, the bladder loses its irritability, and the alkaline urine, perhaps ammoniacal and charged with

mucus, resumes its normal reaction and appearance. This is a matter of almost daily observation.

The second indication is to prevent the contents of the bladder keeping up or adding to the inflammation which has already commenced. Offensive urine and tenacious alkaline mucus are in themselves sufficient elements for the production of inflammation irrespective of the obstruction in the canal.

To correct this, and to remove excess of mucus, the bladder must be submitted to irrigation. A dirty bladder requires ablution just as the nasal passages do when they are the seats of offensive ozæna. But not only does the bladder under these circumstances require washing out, but it often is the better for submitting to various medicinal applications. These will be more advantageously referred to when I come to speak of the process of washing out the bladder, and the various indications to be fulfilled.

*Sub-Acute Cystitis.*—This is a serious form of the disorder arising out of obstructed micturition, as it is generally met with under circumstances pointing to neglect and delay on the part of the patient. It is most commonly seen in connection with advanced forms of stricture of the urethra, more rarely with prostatic obstruction. These cases generally present themselves to our notice in the following way :—

We are called to see a person who has been suffering from stricture for some years, the difficulty has gone on increasing, the urine has become ammoniacal, and his rest is hourly disturbed to pass water, which he does in small drops after much straining. Broken down with all these symptoms he becomes feverish, his tongue is brown, and he exhales a sickly sort of ammoniacal odour : his bladder evidently contains some urine. In addition, his temperature is high, his pulse rapid and feeble, and he may have had a rigor followed by perspiration. Under such circumstances he presents a very melancholy picture. Probably, with difficulty, a small catheter is passed and some highly-fœtid urine at once escapes. The

general and local state all indicate a condition of cystitis verging on the acute, with kidneys inflamed. In a long experience of strictures presenting every phase of the disorder I have seen a good many of the kind just typified. About their treatment no doubt whatever can be entertained. Your position is this: the patient cannot wait to derive the benefit of any such proceeding as dilatation. No operation for the stricture such as aspiration or internal urethrotomy, or a division is to be recommended, as the patient would be pretty sure in his condition to die most acutely pyæmic. The only way of dealing with him under these circumstances is to regard his bladder in the light of an acute fœtid abscess requiring a free incision at its most dependent point. It would be just about as rational to propose to treat a fœtid ischio-rectal abscess that was poisoning a man acutely, by putting a trocar into it, as to think of relieving an offensive suppurating bladder with a catheter only. To temporize with either condition would be to disregard the first principles of conservative surgery. A grooved staff should be substituted for the catheter, and a free median perinæal incision into the membranous urethra made in accordance with the directions previously given. The bladder should not be emptied with the catheter when first introduced, as it is just as well to leave enough urine behind so as to fully realize the effect of the incision that is made. The bladder should be washed out and allowed to drain incontinently, as I have elsewhere described. In cases of the kind I am now referring to, where the course just urged is promptly taken, I have seen patients pass as it were in a few hours from approaching death to rapid convalescence. By this treatment I have here and there lost a dying patient, but, on the other hand, I know that I have saved many more who would otherwise have died. Subsequently the case may be treated, so far as the stricture is concerned, on the lines already laid down. Having given prominence to what I would speak of as the primary indications in the treatment of cystitis due to obstruc-

tion, I will proceed to notice other means which experience has shown to be of importance in these cases.

In the treatment of cystitis, reference is often made to the reaction of the urine as indicating the necessity of administering either acids or alkalis. On this point I may say that our object should be to obtain that condition of the excretion which most nearly corresponds with its normal state, as being the least likely to provoke irritation. I mention this here again as we sometimes find that alkalis are poured in with a vigorous hand and quite regardless of the fact that healthy urine has an acid reaction. Still we must not forget that a highly acid condition of the urine is often intensely irritating to the inflamed mucus membrane with which it comes in contact.

In regard to diet, Dr. George Johnson has shown the value of milk exclusively in some chronic cases of cystitis; others have urged the use of skimmed milk. The value of this I have frequently observed, the effect of the milk when it can be digested being to render the urine less irritating. The pharmacopœia contains a number of drugs which seem to exercise a soothing or anodyne action upon the mucus membrane of the bladder and urinary organs generally; of these I would particularly mention, *pareira brava*, *uva ursi*, and *buchu*. Amongst the best demulcents we have, well made barley water, the *ulmus fulva* or slippery elm, and the *triticum repens*. *Belladonna* and *hyoscyamus* are often extremely useful in allaying the irritability of the bladder associated with cystitis. There is a combination of infusions of *uva ursi* and hops, with a little carbonate of soda added, which will be often found useful in these cases. I find the following formula serviceable:

℞ Extract. *Pareiræ* Liquid ʒj.

„ Glycyrrhizæ. Liquid ʒij.

Decoct. *Tritici Rep.* ad. ʒviij.

M. Two tablespoonfuls three times a day in a wineglassful of water.

Amongst fruits, the common blackberry appears to exercise

a sedative effect on the mucus membrane of the urinary passages. My attention was first directed to this by two old practitioners who were in the habit of prescribing it in cases of chronic cystitis. I have often found a sort of blackberry-tea a very useful and not a disagreeable demulcent in these cases. It can be readily prepared from the jelly which in many country houses may be found amongst the domestic condiments. The Hungarian *Salvator Foviás* water will often be found useful in this class of affections.

Opiates in the form of rectal suppositories, or administered by the mouth, or hypodermically, must not be used indiscriminately. To give a patient a few hours repose in this way, who really requires his residual urine drawn off by the catheter and the bladder washed out, is on the face of it not good practice; on the other hand, when these points have been attended to, it is often invaluable in removing the extreme sensitiveness of the parts which is due to the disease. The constipation that often attends the use of opium in any form in chronic sufferers from cystitis negatives the good which would otherwise be gained by the sleep and repose the drug gives. The addition of belladonna to the opium sometimes removes the constipating effect of the latter. I cannot say that the bromides are of much service in this class of cases, unless the patient's distress arises more out of nervous than obvious physical causes. Some persons annoyances and mental troubles seem invariably to gravitate towards their large prostate.

Though, as a rule, retained and decomposing urine is the cause of the offensive smell which is sometimes noticed in these cases, still, in spite of catheterism and irrigation, a disagreeable odour will remain. Under these circumstances, the administration of naphthalin will be found exceedingly useful. I generally prescribe it in a pill, containing two or three grains, enclosed in a gelatine capsule. If this is given three or four times a day the naphthalin odour will soon be found to take the place of the still more disagreeable one the urine is capable of generating.

To alleviate the extreme irritability of the bladder, which often remains after the more active symptoms of inflammation have passed away, a solution of morphia, injected into the bladder with a gum-elastic catheter to which a ball syringe is attached, often gives the patient a good night after rectum suppositories in various forms have been tried.

For a similar object, I am now employing in these cases vesical suppositories, containing morphia, belladonna, bismuth, and other soothing agents. I put these into the bladder by means of a pessary-catheter, which has been made for me by Messrs. Krohne & Sesemann. The instrument consists of a silver catheter, open at the end, in which the pessary is placed. By means of this instrument the whole of the urine is first drawn off, after which, by pressing the stylet, the pessary is projected into the bladder. The pessaries are made of the oleum theobromæ, and are so shaped as to fit in the open end of the catheter, thus giving it the appearance of an ordinary instrument, and facilitating its passage into the bladder. The shape of the pessaries is shown in the sketch (Fig. 63); they contain various medicinal applications. A grain of morphia, introduced into the bladder in this way, and repeated twice in the twenty-four hours, has, in several instances, completely and permanently relieved the most distressing symptoms of irritation. I have extended the application of these vesical pessaries to other cases where astringent and direct applications to the bladder are indicated.

I have seen much benefit follow the use of these pessaries and feel sure that a still more extended experience will show the advantage, under certain circumstances, of thus being able to



Fig. 63.

medicate the bladder. I would like to add to my own testimony that of a member of our profession who, after the experience gained by an illness extending over twelve years, writes me from a considerable distance: "I have received more benefit from the pessaries of cantharides than from all the remedies I have tried during the twelve years I have suffered from retention."

I have occasionally been struck with the rapidity with which pus disappeared from the urine under the influence of chlorate of potash. Again, in other cases of this kind, turpentine is of value, five minims, or even less, may be taken two or three times a day with a little mucilage. I have seen it help importantly to clear up the urine and give tone to the bladder. Benzoic acid is also of service in the same way.

There are causes of cystitis other than those I have enumerated, for the sake of convenience, in a tabular form. A paralysed bladder, as we see in disease and injury of the spinal cord, is, sooner or later, almost sure to become an inflamed one in the way that has already been explained. In the surgical wards we find this in cases of fractured spine, where there is retention. Catheterism and washing out the bladder will do much towards mitigating the distress of the patient and averting a fatal issue; for, where recovery has followed, much of the success is due, I believe, to the absence of inflammation of the bladder. In employing catheterism in these cases, we ought not to forget that, owing to the absence of sensibility in the parts, much damage may be inflicted by an injudicious employment of instruments, without the patient expressing that consciousness of pain which otherwise he would do. The greatest care should consequently be exercised in drawing off the urine, to avoid any laceration of the urethra or bladder, which, considering the state of the urine, would be sure to provoke further complications. Almost the whole comfort of the patient suffering from fracture of the spine depends upon the manner in which his urinary symptoms are anticipated and managed. Perinæal cystotomy has been practised in these

cases by Mr. D. Harrisson, with the object of dispensing with catheterism altogether ; but I have no personal experience of it myself under these circumstances. I can endorse the remark made by the late Dr. Hilton Fagge, that the tendency of urine in paraplegia to putrefaction may be completely checked by the administration of salicylic acid by the mouth.

There are cases of chronic cystitis in the male where the expediency of performing cystotomy, and draining through the perinæum, may with much propriety be considered for the purpose of giving the bladder a complete rest, both from the operation of catheterism as well as from its own irritable contractions or spasms. In some instances, where all other means have been tried and failed, very satisfactory results have been obtained ; that is to say, the patients have derived permanent advantage. This matter has, however, been tolerably fully discussed in connection with the operation of perinæal section.

Atony of the bladder is a not infrequent consequence of retention of urine, and is often seen in connection with cystitis. From long continued over-distention the viscus becomes a mere flaccid receptacle, and loses all power of expelling its contents. An inflamed atonied bladder sometimes represents a very treacherous combination to deal with. A patient may rapidly succumb either to a form of septicæmia or low peritonitis under these circumstances. Where there is atony or paralysis of the bladder every care should be taken where it follows retention to bring back contractility again by catheterism, the avoidance of cystitis, and the judicious use of such medicines as seem to exercise a power of toning the muscular coat of the bladder. Under these conditions, the question sometimes arises, Should a catheter be permanently retained in the bladder ? My own opinion corresponds with the following remark by the late Mr. W. Hey, of Leeds : " I feel sure that a patient sooner regains the power of emptying his bladder spontaneously when the catheter is withdrawn after each time

it is used than when it is retained." Temporary atony is sometimes seen following pressure from over retention of urine, just as the arm may be temporarily paralysed by lying on it. To prevent atony becoming permanent much may be done by the mechanical measures that have been advocated. In addition, medicines such as iron, nux vomica and its alkaloid, strychnia, have proved themselves useful. Electricity might also be tried if other means failed. The tincture of cantharides is an old-fashioned remedy, which, in addition to its diuretic properties probably exercises a direct stimulating action upon the bladder by its presence in the urine. Von Langenbeck has found considerable benefit from the hypodermic injection of ergotine. The propriety of emptying the atonic bladder either rapidly or by degrees has been already discussed in connection with the treatment of retention of urine.

Care must be taken to draw a distinction between the bladder that is either entirely or partially atonied because the patient is ataxic, from the commoner form of local paralysis, to which reference is here made. I have known the bladder treated pretty actively with the view of arousing its supposed dormant action where attention should also have been devoted to the state of the nerve centres, which was the primary cause of the suspended action in the part.

In the treatment of cystitis as it occurs in females, you can have no better instructions than those contained in a very practical paper on this subject by Dr. J. Braxton Hicks. The author points out how little is to be expected from internal remedies beyond correcting such abnormalities as the diseased state of the urine and disorder of the functions generally, and how much may be done by local treatment. Reliance is chiefly placed upon washing out the bladder with slightly acidulated warm water until it is clear of phosphates and mucus, and afterwards injecting, with a view of its retention, a solution of morphia. Subsequently permanganate or chlorate of potash is employed in a similar manner. On the subsidence of the

acuter symptoms, injections of tannin or of perchloride of iron, followed by morphia, are substituted, and are again changed as the bladder becomes less sensitive for more potent astringents, such as the nitrate of silver. "The benefit of such management is very marked in cases of paralysis where, from retention or the rapid ammoniacal decomposition of the urine, the distress and constitutional irritation are very distressing; and thus we can often lessen the chance of the extension of the irritation to the kidneys. Again, in malignant disease, the simple injection of acidulated warm water gives amazing comfort, removing the phosphates and ammonia, and when to this is added the morphia, a wonderful comfort is felt. Indeed, so much relief is obtained that, with a large calculus in the bladder, its presence is almost entirely unfelt if morphia be daily injected." \*

There are forms of chronic cystitis and vesical irritability in women of a very obstinate nature where it is difficult to detect any structural alterations. In some of these cases Mr. Teale † has shown that great benefit follows inducing a condition of transient incontinence of urine by the over dilatation of the urethra. This is a mode of resting the bladder, which like others, where a temporary vesico-vaginal fistula is established by incision, may, with advantage, be employed in obstinate cases of the kind referred to. As I have said before, for the sympathetic or local irritation alone, which so frequently attends urinary tuberculosis, I have not met with such results in my own experience which would make me commend this principle of proceeding. The reflex irritation of urinary phthisis is best met by anodynes.

\* *British Medical Journal*, July 11th, 1874.

† *The Lancet*, vol. ii, 1875, and vol. i, 1876.

## THIRTIETH LECTURE.

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### THE MECHANISM AND MATERIALS FOR WASHING OUT THE BLADDER.

AFTER the general consideration of cystitis, I shall now occupy attention with what may appropriately be called the toilet of the bladder. This will include, first the mechanism, and then the material appropriate to each class of case.

The contrivance I usually employ both in hospital and private practice is extremely simple, it consists of a soft silk catheter with a large bevelled eye and a rubber bottle holding four or six ounces of fluid with a brass nozzle and stopcock, which can easily be screwed on. The nozzle should taper to a fine point so that it may fit catheters of various sizes. I used to employ double-current metal catheters, but these I have discarded, partly for the reason that an unyielding instrument is not so generally applicable as a flexible one, and, secondly, because there is no object in having an arrangement for the synchronous flow of fluid into and out of the bladder. Again, I would repeat that, as a rule, the catheter which is best adapted for this purpose is the one that goes in most easily to the patient.

The catheter having been introduced, and the rubber bottle filled and connected with the former, the nozzle is turned and the fluid is gently pressed by the hand onwards to the bladder. Two or three ounces usually suffice for a time, the nozzle is again turned and the fluid retained in the bladder for a few moments; it is then allowed to escape. This process may be repeated two or three times until the return fluid indicates that

the object intended has been attained. The whole process not only should be a painless one, but the patient should be conscious that some relief has been afforded. If bleeding is caused or spasm provoked, then we may conclude that either the process might be improved upon or the ablution in that particular form be dispensed with.

Now, although the object can be attained in this comparatively simple manner, there are one or two contrivances connected with it to which I will refer, as some surgeons or patients may find them more convenient or effectual. Mr. Buckston Browne\* has described a simple tube which can be fitted to almost any catheter, by means of which an ordinary Higginson's syringe may be adapted for pumping the requisite fluid into the bladder, whilst by removing a finger from over one of the openings the current is reversed and the fluid ejected by a waste outlet. This is an ingenious and useful adjunct to any catheter that may be employed for washing out the bladder, and has proved to be effectual for the purpose.

I used to employ for washing out the bladder a glass funnel, to which was fitted about two feet of rubber tubing, and then connected with the catheter. When the funnel is elevated and water poured in, the latter by hydrostatic pressure proportionate to the calibre and length of the tubing, is carried into the bladder; by lowering the funnel below the level of the patient's pelvis the water escapes from the viscus. For self use I find persons generally prefer the bottle and catheter arrangement first described. Where, however, patients have to wash out their bladders as part of their daily toilet, a modification of the funnel arrangement suggested by Dr. Keyes, of New York, will be found simple, convenient, and effective.

From the accompanying sketch (Fig. 64) it will be seen that the apparatus consists of a vulcanised india-rubber bottle (A), capable of holding a pint of fluid, which, by means of a ring, can be suspended to any convenient hook; a piece of tubing,

\* *The Lancet*, October 18, 1884.

five feet in length (B), terminating in a stop-cock (c), which permits fluid to flow either through the catheter end (D), or the outlet pipe (E), according to the direction in which the tap is turned. A conical metallic catheter mouth-piece (F) completes the connection between the catheter (G). A soft rubber catheter is generally preferred. The instrument is used in the following

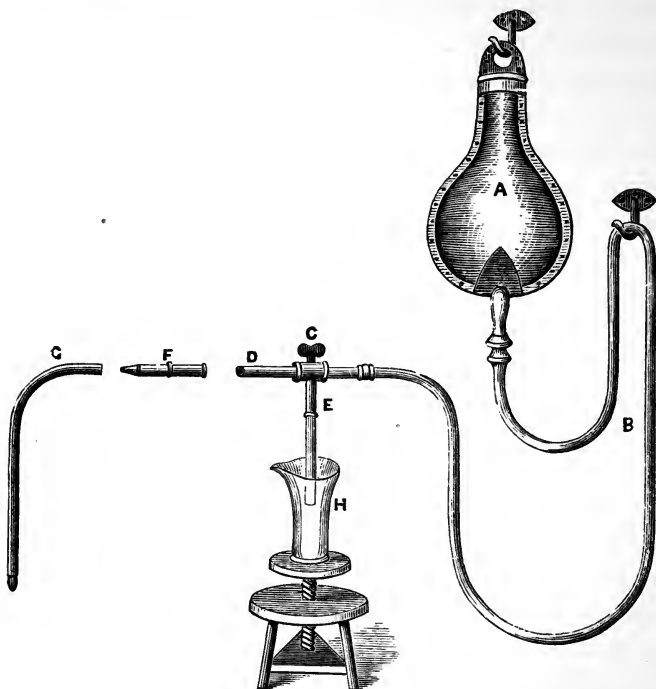


Fig. 64.

way :—The bag being filled with the fluid to be injected, is hung up about six feet from the floor. The stop-cock (c) is then turned until some of the fluid escapes, so that no air is allowed to enter the bladder. The patient, being in the erect position, then introduces the catheter and connects it with the tubing. By the alternate action of the tap (c) the fluid is made either to enter the bladder or to escape; if the latter, it passes

into the receptacle (H). The instrument can be readily adapted to the recumbent position. Beyond other advantages I have found the apparatus to possess, it enables patients to perform this operation without assistance.

Care should be taken to prevent the forcing of air into the bladder along with the fluid to be injected. When the urine is bloody, the presence of air in the bladder speedily leads to putrefactive changes and the evolution of gas in considerable quantities, which not only is most offensive, but is capable of producing retention of a very painful character. I have observed these effects to follow, and hence the necessity for this caution.

There is one source of annoyance which patients occasionally complain of, and which I will mention, as it is quite easy to avoid, and you may not at first think of it. As the bladder is expelling the last portion of the injection, if the surgeon is holding the catheter, he sometimes feels a slight click or shock, which the patient with a sensitive bladder is conscious of and rather dreads, though it is very momentary, on the next occasion the operation has to be repeated. I believe it is caused by the mucous membrane being sucked into the eye of the catheter as the bladder is emptied of the last few drops. It is to be avoided by carefully watching the flow, and withdrawing the catheter until the end is well within the prostate as the last portion of fluid escapes. It is better to do this than to obviate the inconvenience by having a catheter with more than one eye, as such an instrument is liable to break. A catheter for this purpose should have the eye of moderate size, with its edge bevelled, like the American instrument, so as not to scratch the urethra; the eye should be close to the end of the instrument, to avoid an unnecessary length of catheter being introduced into the bladder.

By any of the plans suggested, or by such modifications of them to suit particular cases as will occur to the mind of the practical surgeon, the process of washing out the bladder can be effectually done. There is just one other caution I would give

here. We have lately, I think, been a little disposed to make this excellent practice *a fashion* in bladder cases where, though there may be a necessity for the catheter, the ablution following is a work of supererogation. I have had to suggest this in practice. In some cases of partial retention where the catheter is necessary, it must not be forgotten that so long as the vesical mucous is normal in quantity and quality it may serve a useful purpose in protecting a surface, which by reason of the inequalities of the bladder, arising out of enlargement of the prostate, has no means of completely contracting or covering itself until sufficient time has elapsed for the requisite amount of residual urine to be excreted. I am reminded of this when I hear patients complaining of irritability of the bladder directly after they have been washed out, which takes a little time to subside. I do not think that in all cases such symptoms are to be regarded as contra-indicating the ablution, but, for all this, it is just as well to have the probable explanation as to what may follow before us. I will now proceed to speak of the various topical appliances which may be advantageously used in connection with the washing out of the bladder.

Topical applications in the form of lotions or washes are required for the following objects, of course there are others, but these are the most prominent and common:—The first condition which we have to meet is the secretion of an excessive amount of very tenacious mucus. This often occurs, as I have already explained, in elderly men, where masses of enlarged prostate tissue have encroached upon the interior of the bladder and caused irritation. As this mucus is seen in the chamber-vessel, so does it occupy the bladder, and sooner or later by its accumulation it excites the urine to decompose, and, by its tenaciousness, provokes spasms by the efforts of the bladder to get rid of it. I know of no better solvent for it than common salt and tepid water, dissolved in proportions of about a teaspoonful to a pint. A few ounces of this run into the bladder regularly every day will soon vastly improve this condition of

things. Salt and water is far less irritating to the mucous membrane, as a rule, than plain water; we recognise this more commonly in the treatment of ozæna. There is no application that more quickly dissolves the scabs and offensive mucus which is met with in this unpleasant affection of the nasal organs.

The next class of cases includes those where the contents of the bladder have been rendered offensive by decomposition. We all know how disagreeable the urine can become to the patient as well as to the practitioner attending him under these circumstances. As a rule, carbolic acid will be found an appropriate antiseptic. It must be used cautiously and not too strongly, otherwise it may become absorbed, and occasion that peculiar condition of the urine known as carboluria. The glycerine of carbolic acid of the pharmacopæia, largely diluted with water, will be found convenient for this purpose. Weak solutions of sanitas and boro-glyceride may also be used for the same purpose. In some cases of excessive mucus exudation and offensive urine, I have found a solution of sulpho-carbolate of soda, in warm water, four grains to the ounce, a most useful wash. Where the urine remains purulent after cystitis nothing succeeds better than a quinine lotion. My attention was first called to the value of quinine for this purpose by a paper by Mr. Nunn,\* who speaks of its action as a bactericide in catarrh of the bladder. When urine contains bacteria, quinine applied in this way will be found very efficacious, as the microscope, as well as the sensations of the patient, will prove. The neutral sulphate of quinine should be used in the proportion of two grains to an ounce of distilled water. If the solution is not quite clear, a drop of dilute muriatic acid may be added, and then it should be strained. A portion of the injection should be allowed to remain in the bladder. I might here incidentally mention that I have found the internal administration of quinine, in doses of five grains, not only act as a sedative to the bladder after cystitis, but useful in influencing the urine benefi-

\* *The Lancet*, Feb. 23, 1878.

cially in some way. Its efficacy for this purpose has been urged by Dr. Simmons,\* who, in explaining the nature of this action, refers to an observation by Dr. Kerner, that seventy per cent. of the drug is eliminated by the kidneys in from three to twenty-four hours after it has been taken. In conjunction with other antiseptics, I employ quinine in this way after operations on the urethra with the best results. It sometimes happens that long after attacks of cystitis the urine remains alkaline, and there is a tendency to throw down phosphates, which often concrete in the form of a mortar-like substance. Here a slightly acidulated wash of warm water will often correct this disposition, which is probably primarily due to excess of vesical mucus. A few drops of dilute nitric acid in water, just sufficient to turn test paper, represent a suitable lotion.

The mucous membrane will sometimes remain particularly sensitive after the acuter symptoms of inflammation have subsided. It is here that soothing or anodyne solutions will be serviceable. For this purpose a solution of borax in glycerine, with tepid water added, makes a good wash. Sir Henry Thompson's formula is a good one † :—Glycerine, two ounces ; biborate of soda, one ounce ; dissolve, and add two ounces of water ; half an ounce of this solution to four ounces of warm water will make a suitable wash. One of the most troublesome cases of irritable bladder arising from this cause, entirely yielded to the daily use of a solution of bismuth. A tablespoonful of the lac bismuthi (Symes & Co.) to six ounces of warm water represents an appropriate proportion. As a local application I have found this salt just as useful in bladder affections as it appears to be in other disorders of the mucous tract, and where it acts, in a measure mechanically, by protecting or coating the irritable membrane.

Other cases of this kind yield to irrigating the bladder with tolerably hot water. You may commence with it at 98° Fahr.,

\* *American Journal of the Medical Sciences*, April, 1879.

† *Diseases of the Urinary Organs*.

and gradually increase the temperature to 115° or 120° Fahr. The late Mr. Guthrie bore evidence to the value of this treatment in these cases.\* In tubercular ulceration of the bladder I have found nothing so useful as a wash as corrosive sublimate; under its regular use I have good reasons for believing that these ulcers may heal; besides, it acts as an antiseptic. It must be used in a very dilute form, one in 20,000 parts is quite strong enough to begin with. As said before, in all operations on the interior of the urethra where a wound is inflicted or the canal is abraded, I invariably leave an ounce or two of this solution in the bladder and have the urethra temporarily filled with carbolized oil (one in twenty). I connect my comparative immunity from rigors and fever to this practice. For the same purpose in tubercular ulceration of the bladder I have been recently using, at the suggestion of my friend, Dr. Prince, of Jacksonville, U.S.A., a solution of iodoform in mucilage of acacia, in the proportion of five grains to an ounce. I think I have already seen good from it, but the offensive smell of the drug is a detriment. In tubercular cases, where corrosive sublimate does not suit, I think it is likely to be a valuable substitute. For free hæmorrhage from the bladder, I cannot say that injections or washes are of any service. The less we interfere instrumentally in these cases the better. It may be necessary sometimes to wash a clot out of the bladder: for this purpose there are no better means than warm water and Clover's catheter and suction bottle for withdrawing debris after lithotrity.

\* *On the Anatomy and Diseases of the Bladder.*

## THIRTY-FIRST LECTURE.

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### SINUSES CONNECTED WITH THE BLADDER AND URETHRA NOT ARISING OUT OF STRICTURE.

UNDER this heading I shall arrange for consideration a variety of cases where sinuses have formed in connection with the bladder and urethra; but, unlike those referred to in a preceding lecture, are not necessarily consequences of urethral stricture. In the latter case there was a guiding principle in treatment; that is to say, it was useless to expect the fistula to close so long as the obstruction to the escape of urine along the natural channel remained. In the examples that will now occupy us there is no such common ground upon which action can be based; on the contrary, in each instance we shall find some exceptional circumstance upon the continuance of which the existence of the sinus depends.

Looking over my own experience of these cases, they will permit of being grouped in the following way:—

1. Sinuses between the bladder and the intestines.
2. Sinuses in the supra-pubic region leading to the bladder.
  - (a) Arising from abscesses.
  - (b) Arising from supra-pubic punctures or incisions.
3. Sinuses connected with the bladder opening externally in other directions.
4. Sinuses between the bladder and vagina (vesico-vaginal fistulæ).
5. Sinuses leading from the bladder into the rectum through the prostate or trigone.

(a) Consequent on prostatic abscess.

(b) Following puncture of the bladder from the rectum, or other similar proceeding.

6. Sinuses leading from the urethra into the rectum following lithotomy, prostatotomy, and urethrotomy.

*Class 1.*—Fistulous communications between the bladder and intestines of a non-malignant character, may be caused in three ways:—

(a) By the passage of foreign bodies from the intestines into the bladder; these have been referred to in connection with extraneous objects met with in the bladder in a previous lecture.

(b) By various kinds of non-malignant ulcerations, such as tubercular and dysenteric, proceeding from the intestine into the bladder. Extremely rarely, I believe, from ulcerations proceeding from the bladder towards the intestines.

(c) By abscesses in relation with the abdominal viscera.

These of course are quite independent of the perforations due to cancerous ulceration which will be considered further on.

Non-malignant sinuses between the bowels and bladder vary much in degree, and these differences will, to a certain extent, serve as indications for treatment.

The symptoms of these fistulæ are usually these: more or less fæces and flatus find their way into the bladder, and if the sinus is sufficiently low down, as in the sigmoid flexure or rectum, urine may be passed in considerable quantities, either pure or mixed with fæces, by the anus. As a rule, these symptoms are the more marked when there is diarrhœa or flatulent dyspepsia. Some persons with these fistulæ only suffer from them when the bowels are much disturbed, as just indicated. One patient I know is only conscious of the passage of air from the bladder when micturition closes with that sort of fizzing sound which an expiring syphon soda-water bottle is apt to give off. In another instance, the entrance of air into the

bladder sometimes occasions most acute attacks of vesical colic. Instances are recorded where intestinal worms have in this way entered the bladder. In the following passage Dr. W. D. Kingdon, of Exeter, sums up the particulars of a case of this kind, which was fully reported and well illustrated \* :—

The calculus (figured) on being carefully divided displayed in its centre a large pin, which satisfactorily accounts for the singular appearances detailed. The poor boy must have swallowed the pin, which, after traversing the small intestines, formed a lodgment in the appendix vermiformis; here the irritation caused by it must have given rise to inflammation and adhesion of the process to the exterior of the bladder, and subsequently by ulceration to the passage of the pin into the urinary bladder, where it formed the nucleus of the calculus discovered after death, though not detected during life. The fistulous communication with the bladder will likewise account for the voiding of the urine from the anus, the natural orifice being closed by the calculus; and also for the passage of the worms through the urethra on the several occasions mentioned.

In cases where these communications are large or direct the amount of annoyance occasioned is considerable; no more miserable existence can be imagined than that attending the mixture of the contents of these two separate organs. Either the small or large intestine may be involved, particularly the sigmoid flexure of the colon. Where the inconvenience is not very great the patient may feel disposed to put up with his annoyance, which in some cases may be greatly moderated by the avoidance of diarrhœa and dyspepsia, care being taken whenever there are signs of fæces entering the bladder that washing out of the viscus is freely employed, otherwise a concretion might be formed, as in Mr. Charles Hawkin's case.† Where, however, the trouble caused by these fistulæ is considerable or increasing colotomy should be practised. And this operation may be undertaken when there is no malignancy,

\* *Trans. of the Provincial Medical and Surgical Association*, vol. x, 1842.

† *Royal Med. Chir. Trans.*, 1858-59.

with a sure prospect of immediate as well as of permanent relief. Mr. Holmes\* and Mr. Bryant† have made important communications relative to the value of colotomy under these circumstances.

In 1869 I assisted Mr. Hakes to operate on a case which terminated successfully. The patient lived for five years and returned to his employment, subsequently dying of renal disease. As this is one of the few cases of the kind where an opportunity was afforded of making an examination of the parts at a considerable interval of time after the operation had proved successful, I will quote from the reports of it. ‡

The patient, a man of twenty years of age, with no history of syphilis or specific disease, was admitted into the Royal Infirmary in 1869 suffering from the passage of fæces and flatus into his bladder. He was in a very miserable condition. He appears to have had some history of difficulty in passing his motions for three years previously. The rectum was unhealthy from ulceration, and a sound could be passed from the bladder into the bowel. Left lumbar colotomy was performed, and the patient made a good recovery. He resumed his employment as a 'bus conductor, and for over three years enjoyed perfect health and suffered but little inconvenience from his artificial anus. Then he appears to have fallen ill and was readmitted into the Infirmary in 1874, where he shortly afterwards died from renal disease. He never had any return of his vesico-intestinal fistula. The *post-mortem* examination was made by Dr. Michael Harris, who attached a drawing of the part to the published records of the case. It is sufficient here to state that the colon from the artificial anus to the bladder was completely obliterated and converted into a coil of fat: the fistulous opening from the rectum into the bladder was also soundly closed, nothing but some old cicatricial tissue remaining. The patient died from uræmia as a result of the extensive degeneration of the kidneys. No further light was thrown on the precise nature of the old ulceration by which the bladder and

\* *Royal Med. Chir. Trans.*, 1865-67.

† *British and Foreign Quarterly Review*, 1869; *Clinical Soc. Trans.*, 1872.

‡ *Liverpool Reports*, vol. iii, 1869. *Liverpool and Manchester Reports*, vol. iii, 1875.

bowel had been made to communicate other than to demonstrate its non-malignancy.

I have stated that, so far as my experience has gone, these sinuses between the intestines and bladder are most commonly the result of ulcerations commencing within the gut. Those proceeding from the bladder are much less common, and are more liable to be followed by fatal results before the communication has had time to assume the characteristics of a chronic sinus. Belonging to this class of perforations is the interesting case recorded by Mr. T. H. Bartleet, of Birmingham, where a perforating ulcer of the bladder made its way into the ileum and caused death, as it were accidentally, by setting up peritonitis. \* The ulcer whilst confined to the bladder, as Mr. Bartleet remarked, appears to have gone through all its stages without presenting any symptoms, and whilst the patient continued to follow his accustomed occupation. A sudden lifting movement, which occasioned acute pain, most probably broke down a recent adhesion between the bladder and the bowel and led to the extravasation of urine, which was the cause of death.

*Class 2.*—Sinuses in the supra-pubic region leading into the bladder. These are of two kinds—(a), arising from abscess; (b), from wounds, surgical or otherwise. Abscesses in the supra-pubic region may be confined in the space which has been previously described as the porta vesicæ, and open both into the bladder and externally. When formed here they are apt to burrow considerably amongst the parts constituting this portion of the abdominal parietes, and thus to prove most difficult to heal. Sometimes they are connected with caries of the pubic arch or with disease of the symphysis itself. In the following case, though there was no such complication evident, the course and treatment of these abscesses is illustrated:—

In 1885 I saw, with Dr. H. W. Knowles, a female patient aged about twenty, under the following circumstances:—Fifteen months previously

\* *The Lancet*, Feb. 5, 1876.

she appears to have had some swelling and pain about the left groin. Three months before I saw her an abscess formed above the pubes which was opened externally, when it was found to communicate with the bladder. In this way a sinus formed which resisted all efforts to close it, including continual catheterism. When we saw her in consultation, the abdominal parietes were undermined by suppuration, and urine welled up through the opening when the catheter was removed. It was advised that the skin should be opened up freely where it was undermined and the catheter again be continuously worn. This was followed with considerable improvement in the general appearance of the parts. Still it was found, even after the catheter had been worn for three weeks, with the whole of the urine escaping by it, that when it was left off for trial, urine escaped by the open granulating wound above the pubes. Then we found, on further examination, that the urine had burrowed completely under the attachment of the left rectus muscle. This we then divided close to the pubes. After another three weeks trial with the continuous catheter it was finally removed, when the wound was found soundly healed. In spite of five months wearing her catheter continuously the power of micturition returned normally, and the patient could hold her water for three hours.

This case illustrates the principles of treatment to be followed out under conditions which may more or less correspond.

Wounds and punctures made into the bladder above the pubes, either accidentally or for surgical purposes, usually heal when there is nothing in the condition of the prostate or urethra to interfere with the escape of urine by the natural passage, though they are sometimes tedious. I have found, in the few instances that have come under my notice, repair eventually took place without resort to any special method of treatment. In connection with such wounds, and with the view of preventing the formation of a troublesome sinus communicating with the bladder, the question might arise whether they should be closed at once by sutures or not. This point will be more fully discussed with the operation of supra-pubic cystotomy, and to this lecture reference should be made.

*Class 3.*—Sinuses connected with the bladder opening externally in other directions than those specified. These sometimes take very long and tortuous courses. In a case where Mr. Bickersteth removed at the Royal Infirmary a very large oxalate stone by the supra-pubic operation twenty-four years ago, the only prominent symptom was a sinus discharging urine which opened near the great trochanter. On the removal of the stone the patient made a good recovery. Some remarkable instances are recorded, chiefly in the practice of military surgeons, where fistulous communications with the bladder have been caused by gun-shot and the like injuries, and maintained by the lodgment of portions of the missiles, or of bone or clothing within the viscus. Unless there has been an extensive breach of surface these openings have usually healed on the removal of the cause. Cases of this kind point to the necessity for a careful examination of the bladder in all instances where a discharge of urine by the wound indicates that a fistulous communication exists.

*Class 4.*—Sinuses between the bladder and vagina, vesicovaginal fistulæ, will merely be mentioned here, as the subject belongs to works relating to the special surgery of this part.

*Class 5.*—Sinuses leading from the bladder into the rectum through the prostate or trigone.

(a) Consequent on prostatic abscess.

(b) Following puncture of the bladder from the rectum, or other similar proceeding, or from injuries inflicted on the parts.

Sinuses occupying this position can generally be demonstrated by ocular inspection through the assistance of the speculum or rectal endoscope. I have found the latter instrument of much more service in this class of cases than with the urethra, as I have on several occasions been enabled to see an opening which could not be reached by the ordinary speculum. In making an examination by the endoscope, the patient having previously had his rectum emptied both by an aperient

and an enema, should be placed in the lithotomy position ; it will then be found possible to explore the bowel for at least six inches. I have divided the causes of these sinuses into two classes.

(a) Prostatic abscesses. Matter formed in this position, either arising from tubercular deposit in the secreting follicles embedded in the prostate muscle, or from follicular prostatitis, as seen most commonly as a sequence of gonorrhœa, will sometimes burst into the rectum, and then establish a fistulous communication between the bladder and the bowel. The treatment of prostatic abscesses has elsewhere been described, and may be referred to in connection with this subject. Sinuses thus formed are extremely difficult to heal by reason of their cicatricial nature and extent. As a rule, however, the openings are small, and provided the patient is not suffering from urethral stricture, very little inconvenience is occasioned. The only instance I know of in my own experience, where operative treatment was indicated and employed, was in the case of a young gentleman whose rectum was much excoriated by the constant dribbling of urine. As the opening could be seen with a speculum, the fistula was touched with an actual cautery wire, and the patient made to lie on his abdomen for a fortnight. The expedient proved successful, as he shortly afterwards left for India, where I believe he remains, quite well.

The following case illustrates some of the features connected with this form of fistula, as well as the treatment which was practised with the view of closing it.

The patient was a medical man, whom I saw in consultation with Mr. R. N. Pughe, in 1884. Twenty years previously he suffered from prostatic abscess which opened into the rectum. He complained chiefly of the discharge of wind along the urethra. To remedy this, the sphincter ani was divided on either side. This, however, did not succeed in remedying matters materially. Subsequently some stricture of the urethra was detected and removed by internal urethrotomy, but without avail.

When I saw him he complained of frequent micturition, and the passage of flatus along the urethra occasionally, but always after micturition. He appears never to expel wind simultaneously from the bladder and bowel. On introducing the finger into the rectum, a prominent elevation is felt, beyond which is a fistulous opening leading through an atrophied prostate into the bladder. Both a full-sized urethral, as well as a rectum bougie, passed easily. I did not consider that the case warranted surgical interference. I recommended the occasional use of a bougie, both for the bowel and urethra, and washing out of the bladder should there be signs of lodgment of fæcal matter. The precise nature of the original prostatitis was obscure.

(b) *Fistulæ following punctures and wounds.* Cocks' operation of puncturing the bladder immediately above the prostate, and proceedings of a like nature through the prostate, have been followed by fistulous communications.

In these cases it must, however, be remembered there is the complication of a urethral stricture. The first indication in treatment is of course to remove, where practicable, the cause of the obstruction. Instances, however, will be found where these fistulæ have proved permanent by reason of the obstructed urethra, the rectum being used as a common receptacle for urine and fæces. It is astonishing how little inconvenience some of these persons appear to have suffered. As a rule, when the fistulæ occupy this position, and are non-malignant, the passage of fæcal matter into the bladder is seldom complained of; should, however, the opening be of such a size as to allow the contents of the rectum to pass into the bladder and distress the patient, then the propriety of colotomy would have to be considered. I met with a patient some years ago who had been operated upon abroad. He told me that he passed all his fæces quite comfortably through a colotomy, and reserved his rectum for his urine, as his urethra was entirely obliterated by an old stricture. Unfortunately, I only saw him on one occasion, and had no opportunity of doing more than verifying his statement. I have not heard of him since, but he appeared to be in excellent health.

Fistulous communications of this kind are sometimes the result of injuries accidentally received.

In 1871, I saw, in consultation with Dr. W. H. Horrocks and Dr. C. Hill, J. M., a boy, aged 14, who in endeavouring to pass between a railway waggon and the engine became empaled on the coupling, and was also squeezed with much force. When I saw him there was a lacerated wound of the rectum almost encircling the bowel. The membranous urethra and back of the bladder were bared, but not torn across. Ten days afterwards it was found that urine and fæces flowed from the bowel, which was in a sloughing condition. Eventually the patient recovered, but the whole of his urine was passed by the rectum.

I saw this patient about twelve months ago, and was surprised to find, considering the extent of his injuries, how comparatively comfortable he remained. The rectum answered fairly well the double function of bladder and bowel. The membranous urethra, prostate, and a portion of the posterior wall of the bladder, were absent. The case was quite beyond the reach of any plastic operation.

This instance illustrates a remarkable form of injury, and a result which was certainly better than could have been anticipated.

*Class 6.* Sinuses leading from the urethra into the rectum following lithotomy, prostatotomy, and urethrotomy. These are generally accidentally caused by the knife, though in some instances the false communication has been undoubtedly produced by the extraction of the stone, or the subsequent sloughing of the parts through an excess in inflammation. It will be well to consider these various conditions under the circumstances they present themselves.

The possibility of wounding the rectum and establishing a fistula with the knife in lithotomy should be regarded as a remote one. This arises out of the consideration that the proper movement of the knife is never, or ought never to be, in the direction of the bowel. As the point of the knife is carried towards the staff, the line of movement is certainly directed away from the bowel; whilst, as the knife is carried along the

staff or withdrawn, its line of movement may be regarded as being almost parallel with the gut.

It sometimes, however, happens in lax elderly subjects that the bowel becomes, as it were, prolapsed into the perineal wound by a sudden expulsive movement of the patient. Under these circumstances, unless the knife is guarded as it should be when feeling about for the staff when the external opening is made, it may very easily be pricked. It once happened to me in this way, in doing a prostatotomy, but no harm followed from it as the puncture was very small; in fact, I should not have noticed it had I not seen a few bubbles of air in the wound. On introducing my finger into the rectum, I could quite easily turn the upper wall of the rectum into my external perineal incision, and in this way I discovered and explained the slight accident that had occurred. It never happened to me in lithotomy, or in any other operation on the bladder of a like kind that I can remember. When, however, such an accident occurs, it is as well to consider here what is best to be done. If it is a mere puncture, it should be left alone; if the wound is more extensive, and can be got at from the external perineal wound by passing the finger into the rectum and making the bowel prominent at the bottom of the opening, it should be carefully examined. Where the wound can be brought together by catgut sutures passed in from the perineal wound, this should be done. I have seen a wound closed by first intention by this expedient. If sutures cannot be introduced in this way, the wound had better be left to take its chance, with the view of remedying matters at some future date as they may arise.

The following illustration shows what may be done to meet the inconveniences permanently resulting to the patient from this accident:

A gentleman, æt 34, was referred to me by my friend Dr. J. De Vere Hill, of the Cunard Service, under the following circumstances:—About 1867, when aged 16 years, he had undergone lateral

lithotomy in this country by an eminent surgeon. Unfortunately the rectum was opened into, and, in spite of treatment, a fistulous communication was the result. The inconvenience, however, was limited to the escape of urine when the bladder was full, and no apparatus was then necessary. Two years previous to my seeing him, an attempt had been made by a distinguished surgeon in America to close the fistula with the cautery, but unfortunately with the result of making the opening larger, and the inconvenience greater. To remedy this, he had a sort of air tampon (Fig. 65) made by Messrs. Tiemann, of New York, which very effectually stops the leak, and permits the patient to go about his usual avocations, and to ride, with but little inconvenience. He consulted me in reference to a small pile which came in the way of the tampon whilst being introduced, and which I removed with the clamp and cautery.

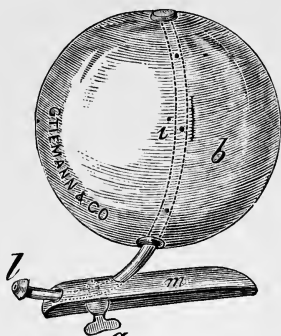


Fig. 65.\*

The cicatricial character of the fistulous track would render any attempt to close it by a plastic operation of very doubtful utility.

\* Letter *l* shows where the inflating pump is attached; *a*, the stopcock below; *m* is the round spoon-shaped metal disk, narrow and elongated, and open below; *i* is the perforated tube extending to the end of the globe (inside the globe). The globe, *b*, of pure thin rubber, is now inflated. The drawing is about half size.

## THIRTY-SECOND LECTURE.

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### RUPTURE OF THE BLADDER AND OTHER INJURIES.

RUPTURE of the bladder is an injury which until recently has been passed over with comparatively little notice, from which we may infer, not that those who have preceded us were less capable of determining the nature of the lesion, but that their means of dealing with it were only limited. The introduction of anæsthetics and the recognition of those principles upon which the use of antiseptics are based have done much to advance the surgery of the important cavities of the body. It is a matter of much congratulation that rupture of the bladder into the sac of the peritoneum has been recently demonstrated by Sir William MacCormac to be within the reach of surgery, and that we need no longer regard this as necessarily a fatal injury. Reference will again be made to the two successful cases of this kind which Sir William has recently published.

Rupture of the bladder is usually caused by violence applied over it from without when it is in a more or less distended condition, or by penetrations from within, as by the sharp ends of fractured bones. It is also believed to have been ruptured by muscular violence;\* and further, it may be penetrated by bullets and other missiles.

Amongst the contributing causes of rupture of a bladder, the walls of which from chronic disease are presumably unhealthy, Mr. W. H. Bennett has illustrated† the puncture made by the aspirator needle. The case is worth reading and remembering;

\* Dr. MacEwen, *The Lancet*, Sept. 27, 1873; also see page 36.

† *Royal Med. and Chir. Society*, Feb. 22, 1887.

but I do not think such a contingency will disturb the conclusions already drawn in favour of this method of dealing with retention in certain cases where catheterism is impracticable. That there are persons so feeble or so diseased as to be incapable of repairing even the smallest puncture wound wherever and for what purpose it is made, will be admitted. The outlook of such individuals, should they be the subjects of retention of urine which the practitioner cannot relieve with the catheter, is most unfavourable, whatever alternative proceeding may be substituted for the best and most natural method of emptying the bladder. I believe in the long run a carefully performed aspiration will probably be found to be the safest temporary expedient under these circumstances.

In the examination of cases of rupture of the bladder we shall have no difficulty in recognising two varieties—(1), intra-peritoneal, where the cavity of the peritoneum is opened into, and (2), extra-peritoneal, where the cavity is not opened into. The difference is obviously this, that in the former variety the urine passes directly into the peritoneal cavity, whilst in the latter it tends to infiltrate the tissues around the bladder, and thus produces consequences in every respect similar to those observed in parts which are more superficial where the effects caused by urinous infiltration can be observed. Though I have seen a considerable number of both of these varieties in the male, I have only met with one instance of rupture of the bladder in the female, where the patient was run over by a tramcar and the pelvis extensively fractured.

In practice we meet with cases of rupture of the bladder under two kinds of circumstances—(1), with the history of an injury involving the pelvis, such as a fall or a blow; and (2), with no such history whatever. In three cases of rupture of the bladder I have seen not only was there nothing in the history to give rise to such a suspicion, but several hours elapsed before there was anything to indicate that the bladder might be involved. It must not be forgotten that many cases of rup-

ture of the bladder have required medico-legal investigation, as in fighting, wrestling, and so forth, a circumstance which has sometimes added considerably to the difficulties of obtaining a reliable history of the case. In hospital practice it has happened that cases of rupture of the bladder have not been recognised because not complained of, and thus the patients have been allowed to go to their homes and to remain there until local symptoms have showed themselves. These considerations are important to bear in mind, for, as it will presently again be urged, the successful treatment of this lesion almost entirely depends upon its early recognition.

It is a good rule in all doubtful cases of pelvic injury, especially where the patient is insensible by drink or other cause, to examine the bladder with the catheter. I have known two instances where a ruptured bladder was thus at once diagnosed. Now that rupture of the bladder has been proved to be remediable, this remark applies with still greater force. Twice have I known prominent jockeys killed by their horses rolling over them in steeplechases. In both these instances fractures of the pelvis were almost necessarily rendered fatal by being complicated with ruptured bladders. In one of these I believe our modern method of dealing with an intra-peritoneal rupture of the bladder, whether complicated or not with a fracture of the pelvis, would have afforded the patient a good chance of recovery.

A rupture of the bladder is generally suggested by the history of the accident, and demonstrated by what follows the use of the catheter. If a man's pelvis is violently crushed, or a distended bladder is suddenly compressed, as when one person falls on another, as in wrestling, it is not improbable that the bladder will be found ruptured. Such a history as this is at once suggestive of the use of the catheter. In intra-peritoneal ruptures it is often found that the end of the instrument makes its way into the peritoneal cavity, thus at once demonstrating what has taken place. Cases of extra-peritoneal rupture are, as

a rule, not determined in this manner; there is usually hæmaturia and evidence either of pelvic fracture or extravasation of blood and urine in immediate relation with the bladder, as will be seen in the instances which I shall bring forward.

In cases of rupture of the bladder no very fine distinction should be drawn; that is to say, the risk attending leaving a ruptured bladder alone is so great compared with an exploratory incision that we should in all cases, where there is reasonable doubt, not hesitate to adopt the latter proceeding. We have the less reason for hesitation in the adoption of such a course when we consider that incision is necessary, in one or other position, to bring about recovery, whether the rupture prove either extra or intra-peritoneal.

Summing up our present experience of the operative treatment of rupture of the bladder, I should say: where the catheter shows that it is intra-peritoneal by entering the cavity of the abdomen, laparotomy should be proceeded with at once. Where the rupture is probably extra-peritoneal, as evidenced by blood or urine-effusion, or fracture of the pelvis, then perineal section is to be performed as affording the most convenient means of drainage for either effusion that may have taken place; if perineal exploration shows that the cavity of the abdomen has been opened into by the rupture, then laparotomy in addition will be called for.

Dr. R. F. Weir, of New York, has recently employed \* a method of distention which may be useful in cases where the diagnosis of ruptured bladder is doubtful. After describing the injuries in this particular case and the symptoms, he proceeds:

Only two procedures seemed available therefore, viz., digital exploration by a perineal incision,† or by opening into the abdominal cavity. Rather than resort to either of these I thought of using the test of disten-

\* *New York Medical Record*, Jan. 22, 1887.

† See an article "On Rupture of the Bladder treated successfully by Perineal and Hypogastric Incision and Drainage," *Medical Record*, New York, March 29, 1884.

tion of the bladder, as has been employed in the recently improved supra-pubic opening of the bladder for calculus, tumours, etc.

Accordingly, two hours later, the abdominal tenderness having increased, the patient was etherized and a rubber catheter first inserted into the bladder, and then Peterson's rubber-bag \* passed into the rectum and distended with seven and a half ounces of warm water. After this had been done, and after the line of supra-pubic flatness, now slightly augmented, had been outlined by a coloured pencil, seven and a half ounces of a carbolic acid solution—one to one hundred—were slowly introduced into the bladder. When six ounces had been passed in, the contour of the bladder could be felt above the line of blood extravasation, and the additional quantity of fluid served only to make this more positive, especially so on the lateral aspect of the distended viscus. The injected fluid was then allowed to flow from the bladder and measured, and found to correspond with the quantity forced in. The demonstration was perfect, not only as to the impossibility of an intra-peritoneal, but also, from the non-increase in the line of dulness over the pubes, as to an extra-peritoneal laceration, and the rectal bag was thereupon also emptied and withdrawn, and the patient saved from any surgical interference of a more heroic character.

In connection with these remarks I may mention the following case of exploration in my own practice :—

On January 12, 1884, G. H., aged twenty-nine, was admitted into the Royal Infirmary, having tumbled from a railway waggon, a distance of about six feet, with a heavy "set" or stone on the top of his pelvis. On admission some blood was found on the front of his shirt, and pelvic crepitus was detected. He was unable to micturate, and had not done so for three hours previously. A catheter was at once introduced, and about eight ounces of urine, mixed with bright-red blood, were drawn off. I saw him six hours after this (at 11 p.m.), and removed with the catheter about five ounces more urine of a similar nature. The catheter passed easily, was not locked in the bladder, and the urine came off in a steady stream. I also localised a fracture of the right pubic bone. The conclusion arrived at was that the bladder was ruptured, but there was some doubt as to the precise position of the rupture relatively to the peritoneum. I therefore determined to explore the bladder with my finger by a median opening

\* The bag had been encircled by a netting of silk to prevent over-distension, as suggested by me in a recent paper on supra-pubic cystotomy, *Medical News*, December 4, 1886.

from the peritoneum, and to shape any subsequent proceeding in accordance with the result. This I accordingly did, and discovered that the rupture was extra-peritoneal, and situated on the anterior wall a little behind the prostate. The opening admitted the index finger, by which a fracture of the pubic arch could be felt. The position of the rupture decided what should be done. A large lithotomy tube was passed into the bladder from the perineum, through which drainage could be carried on.—13th, 10 A.M.: The patient had passed a restless night, but was not in pain; the urine came away freely, slightly tinged with blood. 5 P.M.: Much pain complained of in the lower part of the abdomen: pulse 95; temperature 99°. He vomited everything, and complained intensely of thirst. 8 P.M.: As the pain and vomiting continued, nothing was given but ice and small doses of opium.—14th, 2 A.M.: Complains of much pain over lower part of the abdomen; fomentations applied; pulse increasing in frequency; temperature 101°; urine draining away freely, and natural in appearance. At 2.30 A.M. the flow suddenly ceased; it was thought the tube might be blocked, but this was not the case. At 8.30 A.M. the patient died suddenly, the abdomen remaining soft and compressible to the last. It was subsequently ascertained that the patient had only left his bed a fortnight previously, after an attack of scarlet fever. He lived thirty-two hours after the cystotomy, during twenty-seven hours of which urine was freely passed through the tube. No urine seemed to have been excreted during the last five hours of life. The operation of opening the bladder was performed on a staff; it occupied only a few seconds, and may be said to have been bloodless.

*Post-mortem Examination.*—On opening the abdomen there were found signs of commencing peritonitis. There was some serous fluid in the pelvis, but no blood. The visceral peritoneum, covering some coils of small intestine in the pelvis, had lost its gloss, and the whole of the pelvic peritoneum was rough and injected. The space in the lower part of the anterior abdominal wall, between the two layers of the transversalis fascia leading down to the bladder (*porta vesicæ* of Retzius), contained some bloody urine; this space was found, on passing a finger into the bladder through the perineal wound, to be in communication with a laceration in that viscus, situated on its anterior aspect, a little behind the prostate. There was no laceration of the peritoneum. The bladder was empty. The pelvis and contents on removal, presented the following injuries:—A

lacerated wound of the bladder in the situation before mentioned, about three-quarters of an inch long, and a similar one in the base of the trigone; a laceration of the perineal tissues below the level of the urethra, but communicating with the operation incision; a fracture of the right side of the pubic arch could be detected by the finger, both from this and from the vesical wound; there was much effusion of blood beneath the pubic fascia in the neighbourhood of the right sacro-iliac synchondrosis, and a similar but rather smaller collection of blood in the sub-peritoneal tissues on the left side around the upper part of the obturator foramen, with complete division of the obturator artery and vein. There were in all six lines of fracture of the pelvic bones. The transverse and descending rami of both pubic bones were broken through about the point of their junction with the ilium and ischium. The left descending pubic ramus was also broken across near its junction with the body of the bone, and on the right side there was a complete vertical fracture of the sacrum running through the anterior sacral foramina.

Taking those cases where the rupture has extended into the peritoneal cavity, there is but slender evidence to warrant the belief that life has ever been saved without the assistance of surgery. How nearly the imperfect drainage afforded by catheterism has been successful is evidenced by the following case:—

At the time of the accident,\* a sensation of something having given way was experienced by the patient. He walked home, a distance of two miles, when he was seen by Mr. Robinson, his medical attendant, who drew off twenty ounces of bloody urine, and continued to do so twice a day for three days, until he was admitted into the Leicester Infirmary. On his admission, Nov. 20, 1871, he presented the following signs:—He was able to walk without assistance; countenance rather anxious; pulse 80, full; skin cold; complained of a sensation of weight in the hypogastric region, but no tenderness on pressure. On percussion over the abdomen an increased area of dulness was detected, and on palpation a distinct sensation of fluctuation. A silver catheter was introduced, and thirty ounces of clear urine drawn off, the abdominal dulness and fluctuation entirely disappearing. A gum-elastic catheter was subsequently passed night and

\* *Medical Times and Gazette*, Sept. 28, 1872.

morning. The patient continued much in the same state up to the evening of December 1st, when, without any premonitory symptoms, he was seized with a severe attack of convulsions, rapidly followed by coma. Every effort was made to rouse him; a catheter was immediately introduced, and about twenty ounces of urine drawn off, consciousness returning in about an hour. On the following day he was again attacked in a similar way, and on December 3rd he was seized with a more violent form of convulsions, and sank in three hours in a comatose state.

*Post-mortem examination.*—Slight bruise over the scrotum. On opening the peritoneal cavity, about four pints of clear fluid welled up through the incision. The bladder was found contracted, and a laceration of its posterior surface to the length of two inches was detected extending in an oblique direction. In other respects the organs presented no morbid changes.

*Remarks.*—This case presents the following points of interest:—First, the power of locomotion after so serious an accident, the patient having walked to his home, a distance of two miles, immediately after the occurrence. Secondly, the length of time he survived—sixteen clear days,—the average duration of life in these cases being from three to seven days. Thirdly, the absence of all signs of peritonitis. Fourthly, could the death of the patient be attributed to peritoneal absorption?"

In this very interesting case there can be no doubt that the patient was almost within the limits of recovery. He was poisoned, I believe, as is suggested, by his own urea, before nature had time to provide some compensating action by which it could have been got rid of. Further, such instances seem to show that, if no extensive damage is done to the structures of the abdomen, if the urine that finds its way into the cavity of the peritoneum is not largely contaminated with blood or other source of putrefaction, and if free escape is provided for urine so effused, serious peritonitis need not necessarily be provoked.

Mr. Henry Morris has recently brought forward \* an important case illustrative of this conclusion.

The patient was received at the Middlesex Hospital in 1879, and

\* *Royal Med. Chir. Society*, Feb. 22, 1887.

treated for a rupture of the bladder consequent upon violence. The treatment consisted of fomentations, opium, and the retention, "just within the neck of the bladder, of a gum-elastic catheter." He recovered perfectly. In 1886 he was again admitted into the Middlesex Hospital, and died shortly afterwards of rupture of the bladder. The parts removed were submitted to a committee, who reported "the specimen exhibits all the features which might be expected at a remote period after rupture of the bladder." Mr. Morris remarks, "this case was reported in 1879 as one of recovery from rupture of the bladder. It is now brought before the Society because in its completed form it affords conclusive proof that an intra-peritoneal rupture of the bladder is not necessarily fatal, but may be recovered from under the simple treatment employed in this case, provided the urine at the time of the rupture is of normal composition."

Though the case is one of considerable interest, yet in view of what has recently been done by laparotomy, I hardly think it is to be taken as a guide for practice in an injury which has hitherto been so almost universally fatal.

In the majority of cases, however, of intra-peritoneal rupture of the bladder, one or other, or all, of the conditions I have just referred to are usually absent. The urine, under such circumstances largely mixed with blood, decomposes and gives rise to that rapid and destructive inflammation which, in spite of all treatment, brings these cases to a fatal termination in the course of a few days. To meet instances such as these, obviously hopeless if left to themselves, it has been proposed to perform abdominal section antiseptically, and to close the opening in the bladder with sutures. Illustrations of this practice have been recorded both by Mr. Heath and Mr. Willett, but, as Mr. Holmes observed in the discussion to which reference has been made in both these instances, the fatal issue was due to the giving way of sutures, so that neither could be quoted against the probable efficiency of the operation.\*

As I have already said, to Sir William MacCormac belongs the credit of having successfully applied laparotomy and the

\* *Royal Medical and Chirurgical Society*, Feb. 25, 1879.

closure of the wound in the bladder to this class of cases. From the published report of these important cases\* the course of procedure seems to have been as follows:—The nature of the injury in each instance being probably intra-peritoneal rupture of the bladder, the abdomen was opened by a median incision and the bladder explored. A rupture having been discovered, it was carefully closed by sutures; the abdominal cavity was then thoroughly washed out with a warm one per cent solution of boracic acid. The wound in the abdominal parietes was then closed. Both patients made excellent recoveries. Without going further into the details of these cases, which have been carefully reported, I would lay stress on some few points which seem to me to be important. It does not appear to have been necessary to pare the edges of the wound in the bladder, though great pains were taken by careful approximation of the sutures to make the bladder water-tight, and thus to prevent any leakage subsequently. Figures 66 and 67 show the kind of suture that was employed, and the extent, so far as the wound was concerned, to which they were applied. Carbolized silk sutures were used. In reference to the use of a catheter, as well as drainage of the abdomen, Sir William remarks, "If the rent be sutured effectively, the patient runs less risk from moderate distension of the bladder, which is all that can possibly occur in a case properly watched, than he does from the consequences of retaining a catheter for some days within the viscus. The experience of my two cases goes far to prove that the catheter may in many instances be safely dispensed with altogether. I am sure, too, an abdominal drainage tube is not in most cases needful, and that its presence proves a source of danger to the patient." Mr. Walsham, of St. Bartholomew's Hospital, has also successfully repeated this operation.

Where the bladder is ruptured external to the peritoneal cavity, and a vent is made for the escape of extravasated urine, recovery may occur in spite of the severe nature of the lesion.

\* *The Lancet*, Dec. 11, 1886.

As bearing upon this, I will cite a case which happened in my own practice at the Northern Hospital.

A middle-aged man was admitted under my care, in 1866, for injuries received by the fall of some earth whilst excavating for dock extensions. His pelvis and abdomen were much crushed.

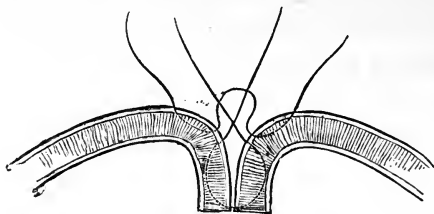


Fig. 66.

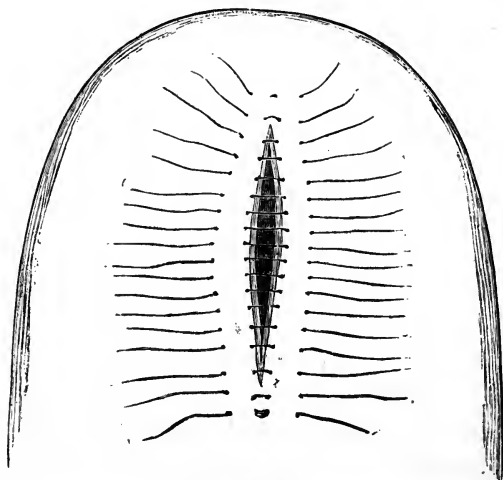


Fig. 67.

There was a fracture of the right ilium, with considerable bruising of the adjacent soft parts. On passing a catheter the bladder appeared to be contracted on the end of the instrument, and nothing but a few drachms of blood-stained fluid escaped. There was a suspicion then that the bladder had been ruptured. The catheter was retained. In the evening I saw him with my colleague, Dr. Lowndes. He was much collapsed ; no urine had escaped or could be withdrawn. The

condition of the bladder, as felt by the catheter, was too suspicious to permit of a conclusion being drawn that the shock of the injury had occasioned a suppression on the part of the kidneys. The perinæum externally was somewhat tumid, but not discoloured. On introducing the finger into the rectum, an unnatural distension in front of the rectum could be felt, which quite concealed the boundaries of the prostate. Under these circumstances, I thought it better to make an incision in the median line in the direction of the prostate. This I did, and gave vent to a large mass of clots and fluid, which I believe was urine. On introducing the finger into the wound, the prostate appeared to be dissected off the parts beneath, and a depression could be felt on its under surface which proved to be the termination of a laceration. Through this deep and extensive wound blood-stained fluid continued to flow during the six days he lived. The view taken at the time was that it was a laceration at the neck of the bladder. So far as the injury was concerned the patient might have pulled through, but the other injuries added to this one were too much for him, and he succumbed of exhaustion on the seventh day. At a *post-mortem* examination the prostate and neck of the bladder were completely separated from the parts beneath, and there was an extensive rent commencing an inch behind the prostate and reaching forwards through it. The wound did not communicate with the peritoneal cavity, and there were no signs of peritonitis. There was a comminuted fracture of the right ilium, the fracture passing down within the brim of the pelvis.

The practice adopted in this case would have probably saved the patient's life had there been no other complication, as the incision provided a channel of escape for the urine as direct and free as I could have wished. Here the only reason we had for supposing that the rupture was within reach, in addition to the evidence that the catheter and the nature of the injury afforded, was the tumefaction of the perinæum and the fulness felt in front of the bowel on introducing the finger into the rectum. This, coupled with the fact that no urine could be obtained by the catheter, justified the conclusion arrived at and the practice adopted.

In connection with extra-peritoneal ruptures of the bladder

it sometimes happens that the viscus is torn in its anterior wall just behind the pubic arch, where it is not covered by peritoneum. This may happen to the comparatively empty bladder, as when wrestling the knee of a person falling strikes with considerable force the abdomen just above the pubes of a prostrate adversary. Here the bladder by the violence that is applied over its fundus or moveable portion is torn away, as it were, from its attachments. In the same way such a tear can be effected by a fracture through the apex of the pubic arch, or, in the young, by a separation of the symphysis. I refer to this form of rupture because it is difficult to diagnose and is sometimes overlooked. Here is another variety of extra-peritoneal rupture; it will serve to illustrate the line of treatment which some further experience has indicated. I saw the case in consultation at the Bootle Borough Hospital with Dr. C. G. Walker and Dr. Maclean, to whom I am indebted for the fuller notes which have been elsewhere reported.\*

The patient, a fireman, aged 40, previously in good health, awoke suddenly about 2 a.m. wanting to pass water, and with pain which he referred to the pubes. Dr. Tanner was called to him, and found the patient collapsed and unable to urinate. He passed a No. 8 gum-elastic catheter, and drew off two pints of bloody urine. Dr. Tanner thought it probable that the man had been drinking, as he had recently come on board. He had been stoking coals, and possibly might have received an injury. Early in the morning the patient was admitted into hospital. His abdomen was distended, dull on percussion, and tender over the bladder. The perinæum was ecchymosed. During the day he passed about thirty ounces of blood. After the diagnosis of rupture of the bladder had been made the treatment consisted in the retention of a rubber catheter, and irrigation of the bladder with weak carbolic lotion. An erythematous rash, suggestive of extravasation somewhere, began to appear over the right iliac region, extending half way down the thigh. Vomiting and great prostration set in, and the patient died on the fourth day after the rupture. There was a cavity about the size of an orange behind the symphysis pubes filled with blood-clots. A rupture was found two

\* *British Medical Journal*, Dec. 16, 1882.

inches in length in the anterior wall of the bladder where it is uncovered by the peritoneum. The urethra was normal. There was no history of injury. Mr. Paul, who made the *post-mortem* examination, felt no doubt that, notwithstanding the history, the injury was due to a blow above the pubes over a full bladder.

We see how in an injury of this kind blood becomes confined in the space, described as the *porta vesicæ* of Retzius, where it may be accompanied by urine extravasation and suppuration. The case, however, has a lesson to teach which will apply to others of the kind. In the absence of any history of an injury it was not easy to attempt to define the position where a supposed rupture of the bladder had taken place. Hence less positive measures were adopted than would have been had the history of an injury in the neighbourhood of the bladder been forthcoming. About the proper course to pursue in a case of this kind I think there can be no doubt. A sufficient median incision into the somewhat swollen supra-pubic space would have led to a considerable cavity, which was tense with extravasated blood, a catheter introduced along the urethra would then have indicated the precise nature and extent of the lesion that had occurred. To carry a drainage-tube through the supra-pubic incision into the bladder by the rupture and out along the urethra would, I think, prove a long and somewhat circuitous route. For the purpose of making the drainage shorter and more direct, and to avoid as far as possible the possibility of a block occurring, I should recommend a median perineal incision into the membranous urethra, in order that the lower end of the drainage-tube might be brought out through the lower incision. These views, which presented themselves to me after a full consideration of the case I have just recorded for my future guidance, corresponded so closely with the practice recently adopted by Dr. Weir, of New York, with success, that I will briefly quote from his report \* :—

\* *The New York Medical Record*, March 29, 1884.

The case was one of injury to the pelvis and left hip, of a man, aged twenty-eight, by a fall of earth. A catheter was passed, which gave exit to a moderate amount of bloody urine. The injury was regarded as a slight urethral laceration, but the marked increase in the supra-pubic dulness, which now extended four inches above the pubes and across into each groin, with tenderness, led to a closer examination of the patient. The catheter passed readily into the bladder and only occasionally gave exit to blood-stained urine. The urine itself was passed at times voluntarily, and was not apparently diminished in amount. The temperature was but 99°. Abdomen not distended, though its walls above the dulness somewhat rigid. Condition still good. No signs of fracture elicited, but the finger in the rectum detected a softer spot on the left side of the prostate which was decidedly painful. The ecchymosis of the scrotum and perineum was now very pronounced.

November 24th.—The temperature had risen to above 100°, pulse 104, and patient began to be restless and disposed to vomit. Tympanites increasing, with abdominal tenderness not only above line of dulness but below it. A large hypodermic needle inserted in the hypogastrium drew out some bloody fluid with an acid reaction and urinous odor. Nothing distinctive could be felt in the rectum. The patient was etherized and an incision, under sublimate irrigation, 1 to 1,000, was made three and one-half inches long in median line, midway between symphysis and umbilicus, until the subperitoneal cellular plane was reached, where a large cavity, containing at least a pint of bloody, undecomposed urine, was found. The finger could be carried its full length behind the symphysis, but nothing was detected. To effect a more complete diagnosis, as well as to allow of the carrying, if possible, of a drainage-tube from the hypogastric opening down and out of the perinæum, the patient was placed in the lithotomy position and, on a staff introduced into the bladder, a median incision was made, opening the urethra just anterior to the prostate. The finger passed in here toward the bladder revealed a rent running along the left side of the roof of the prostate which was lost in the wall of the bladder itself. Through the supra-pubic incision a large silver catheter was carried, and, aided by the finger in the perineal wound, was caused to pass through the laceration of the bladder and emerge from the lower wound. To the eye of this catheter a thread was attached and a large rubber drainage-tube pulled through as the silver instrument was withdrawn. Each end of the tube was secured by a suture to the

skin, and a second drainage-tube was then passed into the bladder and its external end also fastened in the perinæum. The cavity of the extravasation and the bladder were carefully washed out with a warm sublimate solution of 1 to 2,000, and iodoform gauze placed over each wound, though so lightly that urine could readily flow through the dressing. The progress of the case was in every way most satisfactory, the patient making a complete recovery.

In arranging these notes on rupture of the bladder, I must take this opportunity of acknowledging the great assistance I have derived from Mr. Rivington's important work.\*

Penetration of the bladder by sharp instruments, or by bullets and other projectiles, is occasionally met with in civil as well as in military practice. An unusual case of this kind is recorded by Mr. Treves, from the practice of Mr. Couper.†

A seaman, aged 23, was admitted into the London Hospital on April 26, with a small incised wound of the left buttock. He had been stabbed, in a quarrel, with a sailor's long knife. He walked into the receiving room, but with difficulty; was blanched, and in a condition approaching collapse. From the condition of his trousers it was evident that he had lost a great deal of blood. The wound was about one inch long, was clean cut, and situated exactly in the middle of the left buttock. The finger introduced into the wound passed for some depth in the direction of the great sciatic notch, and that notch, indeed, could be felt. There was a little venous oozing from the wound, which was immediately checked by pressure. The wound was treated antiseptically. The patient complained of no pain other than that immediately about the wound. Shortly after admission he passed his water; it was clear, and contained no blood. Next day, patient appeared quite comfortable, made no complaint, had no difficulty with his water, which was passed at usual intervals and was always normal.

April 28.—Patient vomited several times; complained of pain over abdomen; became restless. Temperature at night 104°. Symptoms of acute peritonitis now became more apparent, and death took

\* *Rupture of the Urinary Bladder*, 1884.

† *Medical Times and Gazette*, June 14, 1879.

place on May 1. Throughout the whole case the patient never had any trouble with his bladder.

At the post-mortem examination the knife was found to have taken the following course:—It had penetrated the gluteal muscles, divided a part of the great sacro-sciatic ligament, and passed through the small sacro-sciatic notch, completely dividing the pudic artery and nerve and one vein. Each end of the pudic artery was perfectly closed by a little clot. The knife had then entered the bladder at its lower part and close to the trigone, making a wound large enough to admit the tip of the forefinger. There was diffuse suppuration of the cellular tissue of the pelvis, and general acute peritonitis.

The case is interesting as illustrating a complication which, from the symptoms, there were no grounds for suspecting, post-mortem examination alone revealing it. In cases of incised wounds, where there is a suspicion or evidence that the bladder is wounded, it is probably the best practice to allow the urine to drain off by a catheter, passed either through the wound, should it be in a dependent part of the bladder, or along the urethra only whichever way it flowed the more freely, rather than to permit of it collecting and being discharged by the expulsive power of the bladder in the ordinary act of micturition. In wounds of the anterior wall of the bladder where the urine is normal, I feel sure, from the experience of supra-pubic incisions made for lithotomy, for stricture, and suicidally, that the best plan is to accurately close the opening in the bladder by deep continuous sutures, as we should do for a wounded intestine, and subsequently, by superficial sutures, to bring together the opening in the skin, allowing the urine to drain off by a retained catheter.

On gunshot wounds involving the bladder I do not intend to dwell at any length, as their discussion belongs to a branch of surgery of which, as civilians, we see but little. A series of interesting cases of this kind will be found in a work which illustrates every variety of wound involving the viscus inflicted in warfare.\* A foreign body which has found its way directly

\* *Medical and Surgical History of the War of the Rebellion, U.S.A.*

into the bladder, or indirectly by ulceration or sloughing, may serve as a nucleus for the formation of stone ; of this we have instances, in the work just referred to, of concretions forming on arrow-heads, such as are used by the Indians, or bullets and other projectiles, on pieces of bone, or on the *débris* of a fractured pelvis which have made their way into the bladder. Portions of clothing, buttons, and other articles of dress, in like manner, have become covered with phosphatic concretions.

In the management of these cases, in addition to the employment of the general principles applicable to the treatment of wounds, there are one or two points which must not be lost sight of. By incision or by catheterism, the most direct escape should be provided for the urine, as its collection in the locality of extravasated blood or damaged tissue is a fruitful cause of destructive inflammation.

It is asserted that rupture of the bladder may occur without extravasation of urine ensuing as a consequence. I do not see what positive evidence of this can be afforded ; the nature of the injury and hæmaturia may possibly suggest it, but this is about all that can be said. If I were to suspect that a slight rupture had taken place, which by some means or other—such, for instance, as the presence of a clot in the wound, its valvular form, or the exudation of inflammatory material—had become occluded, I should not feel disposed either to pass a catheter, provided there was no retention, or to retain one. I would sooner trust to nature completing a task she had commenced so well, aiding her, perhaps, in keeping the parts quiet and the skin active, as we do with a ruptured intestine, by the internal administration of opium. The action of the bladder may be said to be permanently arrested in the majority of cases of fracture of the spine. I have referred to this elsewhere, in my remarks on the importance of carefully attending to the removal of the urine and the general management of the bladder in these injuries.

The power of the patient to voluntarily expel his urine is

occasionally temporarily suspended in connection with other injuries to the trunk. Retention of urine not unfrequently follows concussion of the spine. Power usually returns in the course of forty-eight hours, and, so far as this symptom is concerned, nothing further than regular catheterism is required. In courts of law imperfect power in micturition is sometimes referred to as a symptom of spinal concussion. When it immediately follows an injury and disappears as I have already mentioned, it need not create apprehension as it is only in keeping with the other signs of nerve shock. When it occurs after a lapse of time, and consequent upon an injury, its import is unquestionably grave, as it is probably connected with destructive structural changes in the nerve centre which controls the action of the bladder.

I have seen retention of urine occur in connection with violent contusions, such as crushes involving the abdominal muscles. Their inability to co-operate with the bladder in the expulsion of urine, without causing severe pain, is sufficient to explain this.

## THIRTY-THIRD LECTURE.

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### A FEW POINTS CONNECTED WITH THE SURGERY OF THE KIDNEYS AND URETERS.

THE surgery of the kidney has made such rapid strides during the last few years that it would not be possible to include within the scope of these lectures any systematic clinical description of those disorders which come within its province, or where the surgeon has to supplement the work of the physician. I shall, therefore, not attempt to do more than to offer a few remarks on certain points which have interested me more particularly, in connection with this subject. For systematic information I would refer you to the excellent monographs and communications which have recently been published.

A loosening of the attachments and connections of the kidney frequently follows violent concussions to which the body may be subjected as a consequence of falls and blows. Instances frequently come under observation of persons suffering much inconvenience from an undue mobility of the kidney which has been caused in this way. Hence the importance of rest and proper support in all cases where injuries of this kind have been sustained. I have now a gentleman under observation who suffers much inconvenience from a movable kidney, which had no existence as far as we could ascertain before a severe fall from his horse in the hunting field.

Rupture or laceration of the kidney is usually caused by falls or blows where the violence is applied directly over the organ. In the following case, though there were no means of

verifying, by inspection, the nature of the internal damage, no reasonable doubt could be entertained as to what had occurred.

A dock labourer, aged 42, was in the summer of 1865 admitted into the Northern Hospital under my care for an injury to his back, caused by falling down the hold of a steamship on to the edge of a case of goods. The patient was much collapsed, and there was a considerable contusion in the right lumbar region, without any breach of surface. On partially recovering from his collapse, in the course of a few hours, he passed urine deeply discoloured by blood and small clots. The patient's condition gradually improved, though the urine showed traces of blood for nearly three weeks. On the day following the injury the urine contained some long worm-like casts which were clots that had been moulded within the ureter. These were not present after the third day. In addition, by the microscope blood-casts of the uriniferous tubes were occasionally seen.

In reference to the collapse from which the patient suffered on his admission, though it was extreme, it did not require the use of stimulants. In all injuries involving a laceration of an internal organ we recognise in the collapse which immediately attends them an important provision against internal hæmorrhage. Many lives are sacrificed under these circumstances by injudicious friends plying the unfortunate sufferers with stimulants, forgetting that by thus arousing the heart's action to its normal force the risk is incurred of interfering with the process of clotting by which the vessels are sealed and excretion is immediately suspended. The latter is an important consideration, for if the laceration were sufficient to permit of urine escaping into the tissues about the kidney, this would be a fruitful cause of irritation, such as is seen when urine is extravasated amongst damaged structures. For some time afterwards the injured kidney must be little else than a percolator of water, minus the urinary salts, the excretion of the latter being provided for by a compensating action on the part of the opposite organ. It is to the immediate plugging of the renal bloodvessels, coupled with the fact that, if time is allowed,

the uninjured organ is capable of doing double duty, that so many recoveries take place after rupture of the kidney.

Hence we prefer meeting the collapse which, to a greater or less degree, invariably attends this injury by the use of external warmth, in the shape of hot blankets and sinapisms, which by determining blood to the skin and establishing a diaphoresis, favour those processes of recovery and repair to which reference has already been made. The bleeding from a lacerated kidney usually subsides spontaneously; in some instances its arrest may be aided by gallic acid, matico, ergot, or turpentine.

Dr. H. G. Rawdon reports a case\* I had the advantage of seeing, which stands almost alone in connection with the treatment of extensive ruptures of the kidney, and is an instructive and suggestive one.

Here nephrectomy was performed for rupture caused by a fall in a boy aged twelve years. The operation was undertaken for persistent hæmorrhage and cystitis, the latter being due to retained and decomposing blood-clots. It was hoped that by removing the lacerated kidney both the hæmorrhage and cystitis would cease. The kidney was cut down upon by lumbar incision, and found almost torn across. The two portions were enucleated, ligatured, and removed by scissors. Though the hæmorrhage ceased after this the cystitis continued, and gave rise to frequent and urgent attacks of pain and retention of urine. Lateral cystotomy was accordingly performed, which permitted the removal of a decomposing blood-clot. The patient died on the forty-first day. Nephrectomy was performed on the seventeenth day, and cystotomy on the twenty-first day after the injury to the kidney. At the *post-mortem* examination the opposite kidney was found enlarged, and on section showed numerous points of suppuration. Both the pelvis of the kidney and corresponding ureter were considerably dilated and filled with pus. The condition of the remaining kidney undoubtedly caused the death of the patient. It was also equally clear that the state of the bladder was alone responsible for the suppurative pyelitis which had ensued and caused death.

Though I have never met with an instance of acute urine

\* *Liverpool Med. Chir. Journal*, Jan., 1884.

poisoning following accidental laceration of the kidney or wounds which have been made into it in the course of operations, there can be no doubt that this has happened, as illustrated in the following case recorded by Mr. Dobson \* :—

The case was that of a married woman, aged 35, who had been treated for some time in the country for painful bladder troubles; she was admitted into the hospital, when a swelling was discovered in the left loin. There was no doubt that the swelling was connected with the kidney and probably due to pus. I incised the kidney substance under chloroform with antiseptic precautions, let out the pus which was in the pelvis of the kidney, and after examining the interior of the pelvis with my finger inserted a drainage tube. The operation took place at 1.30 p.m., and occupied only a few minutes; at 4.30 she was taken with violent rigor, and at 5 o'clock her temperature was 106.4. A dose of 15 grains of quinine was administered and her temperature fell to 105° at 6.30; 104° at 7.30; 103° at 8.30; rose to 104° at 10.30, and fell again to 103.2° at 12 p.m. When seen last thing by the house surgeon he thought her fairly comfortable, but she died at 5 a.m., about sixteen hours after the operation. There was no loss of blood and no shock. The external wound was small. It was dressed antiseptically. The case, I think, is important because in these early days of kidney surgery it is not clearly established whether it is better to incise the kidney structure or open the pelvis directly. It is important because I could refer death only to that condition which occasionally manifests itself with rapidly fatal results after operations on the male urethra, and which we term urethral fever, in which a patient may die within twelve hours of an operation on the urethra, or it may be the mere passing of a catheter, and in which nothing is to be discovered *post-mortem*. But, so far as I know, nothing has yet been said, nor has any case been reported, in which similar symptoms have followed operations on the kidney itself. I do not consider death was due to shock in the ordinary sense of the word, for there was no decided shock at the operation.

Rupture of the ureter, or its division by an incised wound, is an accident of comparatively rare occurrence. I have once seen it, in connection with a severe contusion of the loins, in a

\* *Medical Times*, Oct. 31, 1885.

patient who, whilst intoxicated, was badly crushed by a heavy waggon which was supposed to have passed over him in the dark. I think it more probable, from the nature of the injuries, which included a fracture of the last two ribs on the left side, a contusion of the adjacent parts, and a rupture of the ureter close to the left kidney, as well as from a description of the circumstances under which the man was found, that he had been squeezed between the waggon and a large stone. The patient died on the day following his admission to the Northern Hospital without perfectly recovering consciousness. Some blood-stained urine was removed by the catheter, but beyond this there was nothing requiring any special comment as indicating the full extent of the damage.

Mr. Stanley\* has recorded two instances of rupture of the ureter. In the first the patient recovered, and there was therefore no opportunity of verifying the diagnosis which had been made. In both of these cases, the most prominent feature was the collection of fluid in the cellular tissue behind the peritoneum, which had to be removed by tapping. In the second case the patient died in the tenth week after the injury, and *post-mortem* examination revealed the correctness of the opinion formed. It is curious to observe that in each instance, though the fluid removed had a resemblance to urine, yet it was deficient in some of its characteristics, as shown by chemical examination. Mr. Poland† has also placed on record a similar case where, consequent on a violent crush between the platform of a railway station and a moving train, in addition to other injuries, the ureter was ruptured, the patient surviving 135 hours. As in my own case, the damage to the ureter was obscured by the extent of the other abdominal injuries. At the examination after death it was found that the right ureter was torn across just below the pelvis of the kidney. Following immediately upon Mr. Poland's case, in the same volume of

\* *Royal Med. Chir. Trans.*, vol. xxvii.

† *Guy's Hospital Reports*, 1869.

reports, is an article by the late Dr. Moxon on the same subject.\* This paper is partly based on the condition of the kidneys as observed in the case of Mr. Poland, to which reference has been made, where these organs were found with the vessels blocked by *ante-mortem* clots, and showing other indications of the violence to which they had been exposed. It is almost impossible to imagine that a rupture of the ureter could be effected without the greatest amount of violence short only of immediate destruction of life. Even supposing that the requisite force could be limited to the ureter, and continued as by a pull or pressure until it snapped across, one cannot see how such a tube could be so broken without the kidney to which it is attached being, to some extent, structurally damaged. Is it not possible that the damaged condition of the kidney which must be associated with a tear of the ureter, is sufficient to account for the supposed alteration of the excretion which has been observed in cases already referred to (Mr. Stanley's), and in one presently to be mentioned (Mr. Holmes'), where the only doubt as to the nature of large quantities of fluid that escaped from the neighbourhood of a ureter which was believed to have been incised, arose from the fact that examination failed to detect the presence of those salts which healthy urine usually contains? In looking over the analyses of these fluids, they appear to me to be very similar to urine found in another condition of damaged kidneys—namely, in certain forms of Bright's disease, where these organs are scarcely anything but aqueous percolators. I think it exceedingly probable that thrombosis of the renal vessels commonly occurs in connection with rupture of the ureter, and that as a consequence of this the excretion of the damaged kidney is little else than water. If this were not so, how happened it in Mr. Stanley's cases that the escape of urine into the cellular tissue from the ruptured ureters was not

\* "On two Cases of Thrombosis of the Renal Vessels, through injury to the Lumbar Spine; with general Remarks on Thrombosis," *Guy's Hospital Reports*, 1869.

followed by those signs which usually accompany extravasation? Is it not reasonable to believe that in these instances the escaped urine failed to arouse active inflammatory changes, because of the withdrawal from it of those salts, as urea, which produce ammoniacal decomposition?

Mr. Timothy Holmes\* narrates a case where the ureter had been opened by a stab-wound in the back. The injury was followed by the discharge from the wound of immense quantities of clear fluid, which, though differing from urine in composition, was most probably the excretion of the kidney in some altered form. The case is one of much interest, and though not free from ambiguity, as, by reason of the recovery of the patient, the diagnosis was not confirmed by anatomical examination, yet the conclusion arrived at by a critical analysis of other explanations which were suggested is almost irresistible. Might not, I repeat, the altered condition of the urine which was discharged so abundantly through the loins be due to a similarly infarcted state of the bloodvessels of the kidney—as was observed in Mr. Poland's case—consequent on the proximity of the wound to this organ? Is it too utopian to suggest that nature provides for a lacerated ureter by the induction of such changes in the corresponding kidney as will render its excretion the least hurtful to the tissues with which it may come in contact? I cannot help thinking, from the cases I have just referred to, in addition to another recorded in my lecture on extravasation, where a strong probability is furnished that urine which does not contain urea is incapable of producing distinctive changes in the tissues surrounding it, that we have in the view I have advocated the explanation that Mr. Holmes considers wanting in the following remark on his own case: "If it could be shown that a wound of the ureter, or a lesion of that organ, could suspend the true secreting function of the corresponding kidney, while it left its percolating function intact, or even if any theoretical explanation of such a result could be given, the

\* "On direct Wounds of the Ureter," *Med. Chir. Trans.*, vol lx.

case would be quite clear, since the opposite kidney would have double secretive work to do, and the urine passed by the urethra would be scanty, with excess of lithates, &c." I have thus ventured to make a suggestion in reference to a point in connection with these cases which has hitherto failed to receive a satisfactory explanation. Pathological investigation has worked out all the facts connected with this lesion. I have merely speculated as to how these facts may be applied.

The possibility of a rupture of the ureter must not be lost sight of in association with injuries and wounds of the lumbar region. Like after laceration or wound of the œsophagus or urethra, a lesion of the ureter may be followed by a stricture so complete as to occlude the canal. The obstacle thus caused to the passage of urine into the bladder results in a dilatation, not only of the canal behind the strictured point, but eventually of the pelvis of the kidney. In this way the whole secreting structure of the kidney may be removed, and the organ converted into a cyst of considerable dimensions. Illustrations of these injuries are comparatively rare. I have selected the two following abstracts. The first is recorded by Dr. Pye-Smith\* :—

The patient was 24 years of age. About two years previously to his coming into Guy's Hospital he had been kicked by a horse on the left side "under the short ribs." This was followed by hæmaturia. On his admission to the hospital there was a large tumour occupying the left half of the abdomen, the physical characters of which pointed to its connection with the kidney. The tumour was tapped and a large quantity of fluid removed. After death the left kidney was found to be in a condition of cystic degeneration. The ureter was dilated for an inch and a half, when it suddenly became contracted, so as not to admit the smallest probe. A few lines nearer to the bladder it again assumed its normal size.

Dr. Pye-Smith remarks in reference to this case :—

Besides the rarity of hydro-nephrosis from traumatic stricture of the ureter, this case appears to be of some interest as illustrative of

\* *Trans. Pathological Society, London, vol. xxiii.*

the absence of disturbance from the most extensive local lesion, so long as they occur gradually, and affect an organ whose functions can be supplied elsewhere.

The second case is recorded by Mr. John Croft;\* it is interesting as indicating what treatment can do in combating the symptom of renal distension until the disabled organ has undergone atrophy and the opposite one has adapted itself to the whole work of urinary excretion.

The patient, aged 12 years, was admitted into St. Thomas's Hospital. On the day previously he had fallen and hurt his left loin, the injury being followed by hæmaturia. The blood disappeared from the urine on the sixth day. Forty-nine days after the accident a fluctuating swelling was found in the left lumbar and hypochondriac region. The urine was free and normal. A few days subsequently seventy-nine ounces of urine-coloured fluid were drawn off by an aspirator introduced a little below, and in front of, the tip of the eleventh rib. The tapplings were repeated on subsequent occasions until fluid ceased to collect. Mr. Croft remarks: "I imagine that the cure has come about by the atrophy of the left kidney and the obliteration of the cavity. I believe the cure to be permanent."

Early in 1883 I was consulted by a gentleman from South America about an injury he had received in the right loin from a bullock at a cattle ranch. The injury was not attended with an external wound, but was a severe contusion of the part; it was followed by hæmaturia, and more remotely by right hydro-nephrosis, for which aspiration had been repeatedly and successfully employed. The point submitted to me was—if the ureter is merely strictured, and not completely ruptured, can anything be done to save the kidney from atrophy? As it seemed probable that the ureter had been divided, and the corresponding kidney was rapidly becoming atrophied, I advised that nothing should be done, and I have since heard that the patient has completely recovered his health, though there can be no doubt he has lost a kidney.

\* *Clinical Society's Trans.*, vol. xiv.

During the past summer I had under observation at this Infirmary a middle-aged man suffering from a villous tumour of the bladder; the situation of the growth was probably at the orifice of one of the ureters, and possibly within reach of surgical interference. Though, as it sometimes happens in these cases, no necessity for an operation has yet arisen, by reason of the disappearance of the hæmaturia under treatment, I then had under consideration various plans for effecting a more accurate removal of such growths than had hitherto been attempted. Having also in view the possibility of some day meeting with a case where catheterism of the ureter was absolutely demanded at almost any risk, with the assistance of Dr. Barron, the following observations on the dead subject were made.

Lateral lithotomy was performed on a middle-aged healthy subject: the incision into the bladder was extended in front by opening into the membranous urethra with a probe-pointed bistoury, and behind by cautiously extending the cut into the prostate to almost the extreme limits of the muscle. On subsequently removing the parts, it was found that in this way a considerable opening could be made into the bladder without exceeding what I should regard as a safe limit. Though the opening just described permitted a free access to the bladder for the finger, yet no part of its mucous lining could be inspected even with the employment of suitable retractors. With the assistance of the latter instruments and by forcible pressure downwards, with the hand over the pubes, a small portion of the fundus of the bladder could be brought within sight, but the orifices of the ureters could not be seen, nor could any instrument, such as a probe introduced into the bladder through the wound, be made to enter them. The cavity of the abdomen was then opened by a median incision above the pubes sufficient to permit of the introduction of three fingers over the fundus of the bladder. By thus pressing the bladder down towards the perineal wound, the whole of its mucous surface could be

brought into view, including the orifice of the ureters and the trigone. In one subject, by reason of some enlargement of the prostate, the view of the latter was imperfect. With the object of improving this, the following expedients were resorted to :— (1), endeavouring to elevate the part by two fingers introduced up the rectum ; (2), by the introduction of a lever up the bowel ; and (3), by the whole hand passed into the rectum. By the first two methods employed the view of the trigone was not improved, whilst the hand in the bowel, by occupying the whole space, obscured everything. When, however, there was no enlargement of the prostate, it was found possible, with the hand introduced into the abdomen, to bring all parts of the mucous surface of the bladder into sight, including that immediately behind the pubes. It was found quite easy to catheterise the left ureter ; the right required a little more looking for. By a bilateral section of the prostate the search for the latter was facilitated, but the conclusion we came to was that with a natural prostate this additional incision was by no means necessary. It seemed not only possible to bring the whole of the mucous membrane of the bladder into view and within reach of manipulation, and to catheterise the ureters, but, further, with the hand in the abdomen to command all hæmorrhage from the parts through which the deeper incision would probably pass. The latter point could only be verified on the living subject ; it seemed, however, to us a reasonable inference to draw. Abdominal and vesical surgery has recently made such important and almost unexpected advances that it does not appear unreasonable to consider, in their application to cases otherwise unprovided for, those operations on the dead subject which have just been described and were repeatedly verified.

In a recent case operated on by Mr. Rushton Parker, where the floor of the bladder and prostatic urethra were incised more freely than is usually the case, a circumstance which probably arose from the conformation of the stone, almost the whole of

the mucous membrane of the bladder could be readily seen, including the orifices of the ureters, which might, I am sure, have easily been catheterised. The patient was a boy, aged about twelve years. He made a rapid and complete recovery. I thought the case worth referring to in connection with the subject now under notice.

In the female, the operation of catheterising the ureters is thus referred to in a case recently published by Mr. H. E. Clark: \*—"To settle our doubts as to the soundness of the right kidney we again catheterised the ureters. This was done by Dr. Macintyre and myself by means of Pawlik's catheter. The operation is in the female a very simple one, two ridges felt on the anterior wall of the vagina serving as useful and reliable guides, which lead the catheter directly to the ureteral orifices. The small quantity of urine removed from the right ureter was in every respect normal, that from the left contained pus, epithelial debris, and a trace of albumen."

Some rare cases of hernia of the kidney through a wound in the abdominal walls are recorded; of this accident I have never seen an example. I quote the following from Pilcher,† with its references:—

June 3, 1873—S. P., aged 25, was stabbed with a knife in the left hypochondrium; two or three hours after a cough set in, which caused the kidney to protrude through the wound. At the end of twenty-four hours he presented himself at the clinic of Professor Brandt, in Klausenberg, having a pulse of 80, a temperature nearly normal, and being able to walk to a gallery to be photographed. On the fourth day after being wounded the kidney was drawn out and severed, after its pedicle had been ligatured. Rapid recovery resulted. At no time did he show symptoms of uræmia or peritonitis. The quantity of urine secreted increased daily while he was under observation. June 23rd he left the hospital, able to work as before. ‡

Amongst the more remarkable instances of calculus im-

\* *Glasgow Medical Journal*, May, 1887.

† *Surgical Operations upon the Kidneys*, by L. S. Pilcher, U.S.A.

‡ *Wiener Med. Wochenschrift*, 1873.

pacted in the urethra is one that I had an opportunity of seeing through the kindness of my friend, Dr. Rawdon. It was the case of a patient upon whom he had performed lithotomy where the pressure of a calculus in the ureter was subsequently

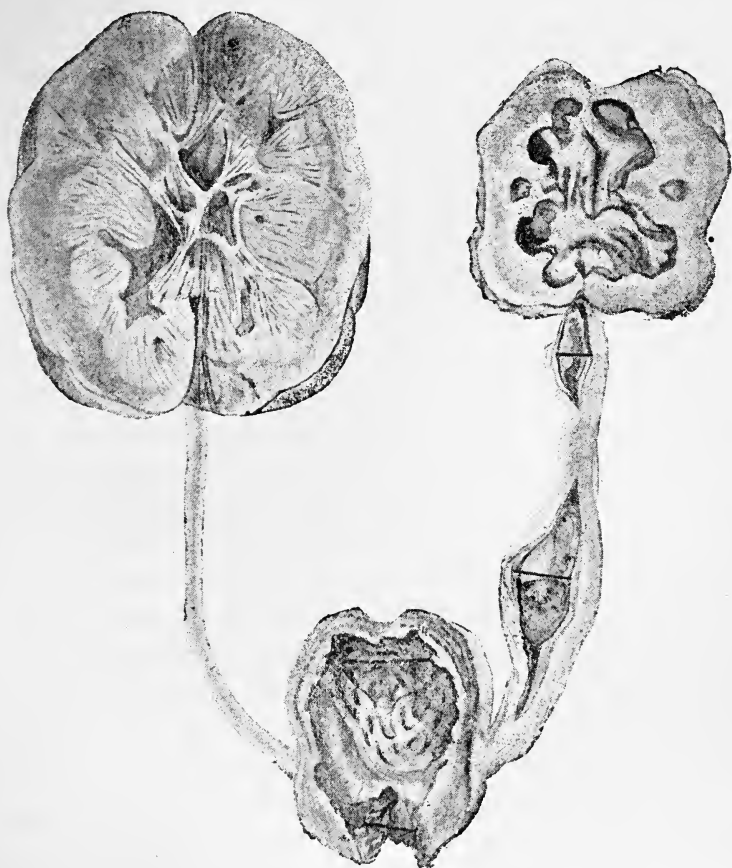


Fig. 68.

diagnosed in a manner that I had not previously noted, namely, by the finger in the rectum. The following are the notes of the case. The appearance of the specimen is shown in the drawing (Fig. 68).

T. F., a male, aged six years, was admitted into the Infirmary for Children on September 20th, 1878, suffering from stone in the bladder. Lateral lithotomy was performed, and portions of broken-down calcareous deposit of a phosphatic nature were removed by the scoop, and the bladder cleared. After the ninth day the wound and general condition improved, and convalescence appeared to be advancing. On the twentieth day, no urine was passed for six hours. This condition was remedied by a demulcent drink. On the twenty-seventh day he complained of pain low down on the left side. In the afternoon he had a sharp rigor. Under chloroform the bladder was explored, but nothing was discovered to account for these symptoms. The rectum was then examined by the finger, and a solid body felt on the left side of its posterior wall. This was diagnosed to be a calculus in the left ureter. He sank on the thirty-second day after lithotomy.

The right kidney was healthy but hypertrophied, being a third over the normal size. The ureter was natural. The left kidney was atrophied, being one-third under normal. The pelvis and calyces were considerably dilated. The left ureter was largely dilated and impacted with friable cretaceous matter, in which two calculi were imbedded. The larger, which was felt from the rectum during life, resembled a date-stone, and was close behind the orifice of the ureter.

There is an interesting case recorded by Dr. Newman, where death followed suppression of urine which had existed for five days. At a *post-mortem* examination, symmetrical blocking of both ureters with calculi was found.

Mr. Henry Morris has drawn attention in a recent paper\* to the feasibility of removing calculi impacted in the lower end of the ureter by perineal urethrotomy in the male, or by dilatation of the urethra in the female, and relates a case where such a proceeding was not only proved to be practicable, but would probably have been successful. After the bladder has been reached with the finger and explored, Mr. Morris suggests the use of a scoop, which he describes: "I speak from a strong conviction when I say that I feel certain had I had such an instrument at hand I could easily have removed the calculus

\* *American Journal of the Medical Sciences*, October, 1884.

from the ureter of the patient whose case I have described." In these remarks another reason is added for a full exploration of the bladder with the finger in doubtful cases of vesical irritability. It has happened to me to dislodge calculi which I believe were stuck in the orifice of the ureters by the use of a sound, and I have seen an instance after death entirely corroborative of Mr. Morris's views and proposals.

It will be convenient before concluding these observations on points connected with the surgery of the kidney, to refer to the treatment of some forms of pyonephrosis and circumscribed abscess of this organ by means of drainage through a median perineal urethrotomy in the male. In my remarks on this operation in one of my earlier lectures, I did not allude to its application under these circumstances, because at the time of its preparation the cases were still in a measure *sub-judice*, and I hesitated to draw conclusions which a further lapse of time might not warrant.

For years past I have often thought that some collections of matter in the kidney might with advantage be drained through an opening in the perinæum, instead of being submitted to other procedures, such as incision from the loin, and even in some instances to nephrectomy. I was first impressed with this belief by observing the marvellous relief it was possible to afford to the ureters and kidneys, which were reasonably presumed to be undergoing sub-acute suppurative inflammation as a consequence of tight stricture in the urethra. Cases of this kind, even with rupture of the urethra behind the obstruction and extravasation of urine added, have so frequently proved so satisfactory to treat, even in the face of these grave complications, that I felt the principles of treatment which guided us here might with equal advantage be extended to some form of kidney suppuration. Nor have I been disappointed in those instances where I had reason to think that the last mentioned condition was the cause of the purulent state of the bladder for which the operation of perineal urethrotomy was undertaken. I

have now operated three times in this way in cases which appeared to correspond with those described by Sir William Roberts as "circumscribed abscess of the kidney." From pathological examinations, there can be no doubt that many cases of kidney suppuration, not only relieve themselves indirectly by the urethra, but that the abscess cavities are drained, and eventually soundly healed. That such cases would be placed at a greater advantage if the pus as it drops into the bladder by the ureters could at once escape incontinently, instead of being voided by the normal act of micturition along the urethra, appears tolerably obvious.

There are several advantages which might be urged in connection with what I would speak of as the tentative employment of perineal drainage in cases of kidney suppuration in the male, where, from the symptoms and state of the urine, it was probable (*a*) that suppuration was going on in one or both kidneys, and (*b*) that the seat of suppuration evidently had a free access to the ureter.

1st. Because perineal urethrotomy might be made to afford a means of continuous drainage, with or without a drainage tube, at little or no risk.

2nd. Because there is no fear of attacking the wrong kidney.

3rd. Because it does not preclude the employment subsequently of further and more direct measures, such as nephrotomy or nephrectomy, should these prove desirable.

In one case of this kind, where drainage through the perinæum was employed, the patient passed an enormous quantity of pus, which I believe came from one of his kidneys; the drainage was kept up for over six weeks, and the patient made a good and I think permanent recovery.

In connection with the diagnosis of extensive suppurations proceeding from the kidney, and which were not likely to be remedied by such a proceeding as I have just referred to, may be mentioned calculous pyelitis, and extraneous abscesses

opening into the kidney or ureter, and discharging their contents into the bladder. In one case, where I opened the perinæum and drained an extensive suppuration, I found the cause of it was a psoas abscess from caries of the vertebra, which had opened into the kidney. My method of drainage was a comfort to the patient, but no permanent good came out of it, as might have been expected. Though large quantities of laudable pus were in this way daily discharged, the re-action of the urine remained acid throughout, and the patient was spared much pain in voiding this mixture of pus and urine.

Dr. Cullingworth\* has reported an interesting case of renal abscess caused by a fragment of carious vertebra ulcerating into the kidney and forming the nucleus of a renal calculus, which may advantageously be referred to in connection with these remarks.

\* *The Lancet*, Jan. 3, 1880.

## THIRTY-FOURTH LECTURE.

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### ON THE FORMATION AND PHYSICAL CONSTITUTION OF URINARY CALCULI—IMPORTANCE OF STUDY RELATIVE TO PREVENTIVE TREATMENT—SPONTANEOUS FRACTURE—PHYSICAL APPEARANCES.

SUCH an enquiry is an essential preliminary to considering the prevention and treatment of stone. To be able to define the earliest condition favouring the formation of calculus would be suggestive of the line of treatment necessary to prevent its occurrence. We are familiar with the chemical composition of the various deposits the urine is capable of yielding; we meet with individuals who go on year after year passing urates, uric acid, or oxalates, and yet remain free from the suspicion of stone, these salts making their way through the urinary passages just as readily as flour will pass through the minute holes of a dredger. Why do they not concrete? What is the law or condition that determines their concretion? Is the human body capable of favouring a process which is observed in the inorganic world, where masses varying in size are built up by crystallization. An examination of calculi reveals facts opposed to such an idea as this, as by far the greater majority evidently consist of mixtures of concreted salts put together in layers without any resemblance to crystallization. Are these calculi, then, formed by what may be described as a cementing process where the inorganic particles are massed together by some organised cement, such as albumen, mucus, or other similar element which the blood or the tissues are capable of providing? The objection to this, which I would speak of as a cementing process, is the apparent absence of any provision for

the hardening of the cementing material. The constant presence of moving urine would in itself prove an obstacle to an explanation based upon such premisses, and as forcibly so as it would in any other analogous process where, by means of a gum or a cement, an endeavour was made to mass together particles of sand or other similar inorganic material whilst exposed to the action of an uninterrupted current of water. Something more than a simple cementing process must be looked for.

In the case of the triple phosphates, the process of stone formation appears to more closely resemble what is known as precipitation, these salts being abundantly deposited when the urine is rendered alkaline by the decomposition of its urea, as we see in cases of residual urine and chronic cystitis. Illustrations of the precipitation of phosphates we have in various morbid conditions of the urinary apparatus. We see it where foreign bodies, such as catheters or bougies, remain for some time in the bladder; in intra-cystic growths, as villous tumours, the fringes of which become coated with triple phosphate; and lastly, in the casing in of other calculi with this deposit. And the latter circumstance has a special interest, as it shows how one morbid process may be superadded to another for the purpose of rendering inert the effects of the one preceding it.

Take, for instance, the calculus the section of which I give as an illustration (Fig. 69, lower illustration). The central portion of this calculus consists of oxalate of lime of most irregular outline. So long as the urine remained acid it appears to have grown by successive additions of that material of which it is so largely and centrally composed. When, however, by reason of its angular and uneven form it had provoked vesical irritation and cystitis, the urine became alkaline, and phosphates were precipitated, by which the uneven stone was coated over until all its angles and irregularities were obliterated, just as completely as if it had been done by a mould of plaster of Paris. It would then seem, in its altered and even form, to have ceased to be a source of vesical irritation and

of alkaline urine, for we notice the reappearance of the original deposit on the margin of the phosphates, indicating that the urine again became characteristic of the diathesis which in the

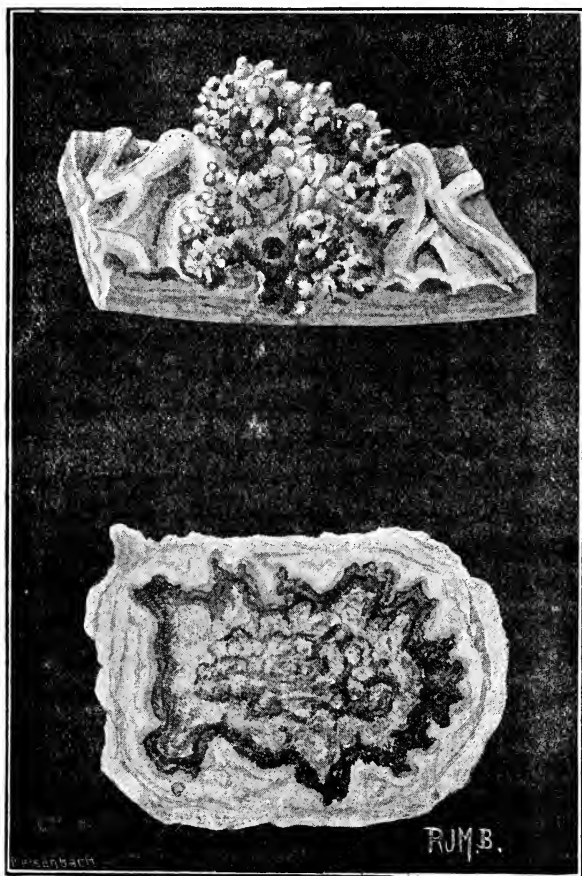


Fig. 69.

first instance led to the formation of a stone. Surely in this we may recognise a distinctly conservative process; and this consideration explains the formation of certain forms of alternating calculi of phosphates and other salts. In these the

irregularities of the primary formation are covered in by the phosphates, until the calculus is rendered smooth; then with the urine again becoming acid, we have the reappearance of the original salt on the periphery of the calculus, until this in its turn requires smoothing down by the phosphates provoked by cystitis, and *da capo*. The clinical history of the patient from whom the stone was taken that has served to illustrate these remarks seems to warrant the assumption I have drawn as to the probable sequence of events; and as botanists and geologists are enabled to explain much of the history and age of vegetables and strata from an examination of their sections, so the pathologist, by a similar process applied to calculi, can describe many of the clinical circumstances which characterised their development and increase; how, at one time, they progressed unostentatiously by an aggregation of that material which represented a constitutional disorder or a diathesis, whilst at another their appearance and the massing of phosphates upon them speak of intense vesical irritation, alkaline and offensive urine, and such-like local distress.

But though precipitation, as seen with the phosphates, may be the first step in the process of stone formation, it cannot be the only one; for by what forces or actions are the separate particles of the precipitate drawn or held together? Can what is seen to follow the lodgment of a piece of bougie or other foreign substance in the bladder be imitated out of it? We must look in directions other than those I have indicated for an explanation as to how the greater majority of calculi are formed, and this, I think, will be found in something more nearly approaching a physiological than a purely physical process.

By the observations of Rainey\* and Ord† it has been shown

\* "Precise Directions for the Making of Artificial Calculi, with some Observations on Molecular Coalescence," by G. Rainey.—*Trans. Microscopical Society of London*, vol. vi., 1858.

† "On Molecular Coalescence, and on the Influence exercised by Colloids upon the Forms of Inorganic Matter," by Dr. Ord.—*Quarterly Journal Micros. Science*, vol. xii., New Series, 1872.

that some salts, in the presence of a colloid material such as gum, or albumen, yield, not crystals, but certain bodies to which Carter\* has applied the term "submorphous," having the peculiarity of adhering not only to existing surfaces, but also to each other, in laminar series. In the urine may constantly be observed urates presenting an appearance similar to these sub-morphous forms, and the existence of an organised material partaking of the nature of a colloid has been demonstrated as existing in a large proportion of urinary calculi. In reference, then, to the concurrence of these two events necessary to the production of a calculus by molecular coalescence, Dr. Vandyke Carter remarks :—" Regarding, first, the probabilities of the case, it seems to me that the necessary conditions for the operation of molecular coalescence may at times well occur in the living human subject; thus an excess of mucus, perhaps altered in character in the urinary passages, or the effusion of albumen, fibrine, or blood and the like, say from congestion of the kidneys or from irritation of the urinary tract, would furnish a colloid medium, with which uric acid, the urates, or oxalates themselves, perhaps in excess, could combine in the manner before described." Added to this is a note from Rindfleisch (vol. ii., p. 143): " I have long been in favour of the view that the epithelial cells with which the straight tubes are lined generate a colloid material in their protoplasm, which they pour out into the interior of the tubes."

The view as to the determining action of colloid material in the formation of stone has, I take it, received a practical corroboration in certain facts which have been advanced in the course of enquiries having for their object the etiology of calculous disease. The Address on Surgery, by Mr. Cadge† includes some important references to this point. Taking the commonest variety of stone—namely, uric acid—I do not think that Mr.

\* *The Microscopic Structure and Formation of Urinary Calculi*, by Dr. H. Vandyke Carter.

† British Medical Association, 1874.

Cadge has proved that the people of the stone-forming district of which Norwich is the centre, actually secrete larger quantities of uric acid than others; proof could readily be advanced if this were so. The explanation of the frequency of stone in this locality seems to lie rather in the circumstances which determine the aggregation of the particles of which stone is composed. From some evidence before us, it appears that the prevalence of stone in a district bears a ratio to that of the hardness of the drinking water. "Hard waters," as Prout remarks, "have a great influence in producing stone," and though this is generally admitted, and chemistry has been zealously applied, it has failed to afford us any satisfactory clue. I venture to submit that the explanation of this is physical rather than chemical or physiological, and lies in the fact that the action of certain waters, denominated hard, occasions direct irritation of the urinary passages; that this necessarily increases the quantity, or alters the character, of the mucus secreted in the urinary tract, and that in this way is furnished the colloid requisite for the aggregation of the normal inorganic constituents of the urine by molecular coalescence.

In reference to the use of milk as an article of diet, Mr. Cadge supplies us with evidence corroborative of this view, for he tells us "that the prevalence of stone amongst the children of the poor is largely due to their not obtaining a proper and sufficient supply of sound milk;" and, further, that the abundance of stone in children "will be found in strict accordance with the difficulty of procuring milk." The soothing effect of milk in a variety of forms of irritability of the urinary passages has been pointed out by Dr. George Johnson, and is now generally admitted, inasmuch as many cases of this kind are completely remedied by the employment of a milk diet. Now, what is the effect of substituting for the natural food of children a diet in which, amongst other things as drink, water of an intensely hard character must be largely consumed without the soothing influence of a milk diet being combined?

I do not think I am begging the question in saying that amongst other changes the most striking will be an increase in the proportion and viscosity of the urinary mucus. Variations in the quantity of mucus following changes in articles of drink may frequently be observed. The non-occurrence of stone in other places where also the water is hard may be explained by the probability of any irritation caused to the urinary organs being compensated by the freedom with which the children can obtain milk as an article of diet. In Norfolk it is not so ; there not only is the water exceptionally hard, but the difficulty of obtaining milk, by which its injurious effects on the urinary organs might be counteracted, in the case of the children of the poorer classes, who chiefly suffer from stone, is described by Mr. Cadge as "lamentable."

And that which is observable as following the irritating influence of certain hard waters in producing an excess of mucus in the urine, is equally noticeable in other forms of irritation produced by altered characters of the urine: the excess of uric acid in the urine of the gouty ; of the oxalates in the dyspeptic ; of the phosphates in the unhealthy urine of those suffering from enlargement of the prostate, are analogous causes, equally capable of producing that excess of mucus which is a natural consequence of the drinking of water unfitted for human consumption. I have frequently noted the excess of mucus in the urine of persons who are passing quantities of certain crystals of uric acid. In these individuals the mucus is sufficient to provide the colloid necessary to molecular coalescence of the inorganic particles, and consequently such subjects may be regarded as more liable to stone formations than others.

But it is not to be supposed that the mere absence of milk, as observed by Mr. Cadge, is to be regarded as the only contributing cause for the formation of stone, for it would seem that the same end is capable of being brought about by other agencies. In a paper of much interest,\* Mr. Plowright, of the

\* *On the Cause and Distribution of Calculus Disease*, London, 1885.

West Norfolk and Lynn Hospital, supports the colloid view as to the formation of stone from a different standpoint, but in no way antagonistic with Mr. Cadge's observations.

He points out "that there is a considerable amount of evidence indicating that the presence or absence of salt in the dietary has a determining influence upon frequency or rarity of calculus." After discussing the evidence, local and general, bearing upon this view, amongst others he draws the following conclusions, which seem to me warrantable: (a) "that the presence of salt greatly increases the solubility of uric acid; (b) that the consumption of salt by increasing thirst ensures a larger amount of fluid passing through the urinary tract, and, therefore, lessens the probability of calculus; (c) that by keeping the colloids equally diffused salt tends to prevent the crystalline solids of the urine from agglomerating into calculi." Mr. Plowright found from experiment that the addition of two per cent. of salt quadrupled the solubility of uric acid. As said before, I have found no better solvent for the thick tenacious mucus which sometimes collects in the bladder of elderly people than a solution of common salt. Hence, though Mr. Plowright's views may not represent the whole truth in connection with the formation of stone in the body, they may be accepted as a practical contribution towards it, worthy both of application and extended observation. In connection with this subject, Mr. Plowright has published a coloured map showing the distribution of calculus in England and Wales, which will be found very interesting. It is idle to suppose that the theory of colloids in relation to stone formation is alone capable of explanation by one set of circumstances acting through the human body; already we know sufficient to recognise the consistency of several, though we may be at a loss to understand the precise determining influences which seem to abound in certain parts of the world where stone is commoner than in others.

The practical value of the theory of stone formation by

molecular coalescence, to which the presence of a material capable of playing the part of a colloid is essential, lies in this—in the prevention of the necessary conditions being provided, or if this is inevitable, the rendering of them unsuitable for promoting those changes which ultimately result in the formation of a stone; and this I submit we are capable of doing to a very considerable extent. If the process of stone formation could be explained only by altered proportions of the inorganic constituents of the urine, would not pathological chemistry, considering how searching the enquiries have been, have done something to determine it? or should we not expect to find some peculiarities in the urine of those residing in a particular district prone to such formations? But it is not so; we must therefore content ourselves with searching for circumstances favouring the aggregation and consolidation of the natural constituents of the urine; and I take it this is to be found in the application of the theory of molecular coalescence through colloids which has been advanced chiefly by Rainey and Ord.

The formation of calculi may advantageously be followed by some observations on what I may call their self-destruction. Such a consideration is not without its object in a practical treatise, for could it be shown that such effects are due not to accidents, as falls or blows, but to certain physical or chemical changes brought about by the constitution of the calculus, or the conditions with which it was surrounded, we might provide ourselves with data which would be of material assistance in further enquiries having for their object the treatment of calculi by solvent agencies. Cases of spontaneous fracture have been recorded by Dr. Ord, the late Mr. Southam, and other observers.\* In these I do not include instances where a stone in the bladder has been fractured accidentally by a fall or a concussion, as by jumping from a carriage; I allude to cases where there are good reasons to believe that other

\* *British Medical Journal*, Jan. 4, 1868.

agencies have been at work. Such for instance, as the case stated by Dr. Ord, to which he adds the remark: "I maintain, therefore, that the fresh specimens support the idea which I advanced upon examination of the first: that in a changed state of urine the nucleus had become swollen, and acted as a bursting charge in a shell."\* A case of this kind occurred in my practice.

A gentleman, aged about sixty, with an enlarged prostate and a slight stricture, arising from injury, was under my care for difficulty in micturition. He was also seen by my colleague, Mr. Banks, and we considered that probably he was also suffering from stone; but, as nothing could be done for the latter until the urethra was dilated, sounding was postponed. The patient was so much better for the treatment his stricture received that he contented himself with occasionally passing a soft bougie, and failed to have his bladder explored. Some months afterwards he called to say that our view was correct, for after some trouble he had passed a stone in several fragments, and was now well. He brought me two of the fragments passed as specimens, having, to my regret, thrown the remainder away. I found them to be fragments of a calculus of some size, which had probably undergone spontaneous fracture, and thus escaped from the bladder.

I cannot comprehend how these fragments thus became broken up other than by forces acting from within. Whether, as it has been suggested,† "calculi can be broken by the contraction of a thickened bladder, much as English walnuts are cracked in the hand," I should hardly like to venture an opinion.

Dr. Ord concludes that there are three ways in which a calculus may spontaneously fracture. (1) From forces arising within the calculus itself; (2) from molecular disintegration; (3) from weakness of the layers within the crust allowing of its fracture.‡ In reference to the second mode of disintegration, it

\* *British Medical Journal*, Sept. 7, 1878.

† *Boston Medical and Surgical Journal*, Dec. 9, 1886. (H. J. B.)

‡ *British Medical Journal*, May 10, 1879.

is probably effected by some altered relation in the colloid to the salt, by which cessation of cohesion, erosion, or falling to pieces is brought about.\*

I cannot help thinking that a distinguished predecessor of mine on the medical side of the Royal Infirmary—I allude to Dr. Mathew Dobson, F.R.S.—founded some views in a work entitled, *A Medical Commentary on Fixed Air*, published over one hundred years ago, on observations derived from a knowledge of the spontaneous fracture of calculi under the circumstances to which I have referred. In the course of his remarks he speaks of changes observable in calculi exposed to the action of altered states of the urine, which have been brought about by the use of waters containing fixed air, similar in character, I take it, to certain German spa waters. The effects upon the calculi so treated appear to be in imitation of those observed in connection with their spontaneous fracture, rather than as arising from the action of solvents. In whatever light it is taken, the communication is one of interest, as bearing upon the views more recently advanced on the treatment of calculi by lithontriptics, and consequently is still worthy of a place in the literature of this subject.

Of the chemical composition of calculi I shall not say much. With some rare exceptions they may be said to consist of urates, oxalates, and phosphates, and I have given them in the order of their relative frequency. From their hardness and flinty nature, the oxalate of lime calculi are least fitted for lithotripsy, whilst, from their softness and friability, the phosphatic ones are best adapted to this operation. The “ring” of the calculus will often indicate to the practised surgeon, when he strikes it with a sound, the probable nature of its composition; the sharp “click” of the hard stones con-

\*“ Mr. Rainey has made known observations on the dissipation of the sub-morphous globules composed of lime carbonate, which claim notice in this place because of the light they throw upon the possible disintegration of calculi within the bladder.”—Dr. H. Vandyke Carter, *Op. cit.*

trasting with the duller "thud" of those composed of more or less phosphates. When a stone is seized by the lithotrite, either for measuring or breaking, the first grip or feel must not be regarded as deciding its composition throughout, as some of the hardest stones have very soft exteriors.

In determining the nature of the various calculi, you will find the table of Dr. J. Campbell Brown, Professor of Chemistry at the Liverpool University College, very convenient. I have his permission to append it.

### TABLE FOR THE EXAMINATION OF URINARY CALCULI.

1. Heat a portion of the powdered calculus upon platinum foil.

Destroyed. (a) *Uric acid*: *Ammonic urate*: *Cystine*: *Cholesterin*:  
*Bile-pigment*.

(b) *Uric acid* from *Calcic* and *Sodic urates*. *Ammonia* from *Triple phosphate*. *Oxalic acid* from *Calcic oxalate*.

Not destroyed. (c) *Calcic phosphate*: *Calcic carbonate*.

(d) *Calcic carbonate* from *Calcic oxalate* and *Urate*.  
*Sodic carbonate* from *Sodic urate*. *Magnesium phosphate* from *Triple phosphate*.

If it chars and gives an odour of burnt feathers, add to another portion a drop of concentrated nitric acid and evaporate to dryness: pink colour; cool, and add ammonia: purple colour; *Uric acid* or *Urates*. If the odour is peculiarly disagreeable, resembling carbon disulphide, dissolve in ammonia, and allow the solution to evaporate spontaneously; microscopic six-sided plates indicate *Cystine*. Mix another portion with lime; ammonia may be evolved from the *Urate* or *Triple phosphate*.

2. Ignite another portion in the blowpipe flame until it burns entirely away—Class (a), see above—or leaves a white residue—Classes (c), (d). If it fuses, it consists of the mixed *Phosphates* of *Calcium*, *Magnesium*, and *Ammonium*. Place a portion of the residue on red litmus paper and moisten with a drop of water; alkaline reaction indicates *Soda* or *Lime*, from Class (d) or from *Calcic carbonate*. Dissolve the rest of the residue, remaining after ignition, in water, and filter. If the filtrate is alkaline, add a drop of

hydrochloric acid, and evaporate cautiously to dryness ; microscopic cubical crystals prove the presence of *Sodium*. Dissolve any residue insoluble in water, by nitric acid, observing whether or not effervescence due to carbonic acid takes place ; add a comparatively large quantity of ammonic nitromolybdate, and heat ; a yellow crystalline precipitate indicates *Phosphoric acid*.

3. Boil a portion of the powdered calculus in dilute hydrochloric acid ; effervescence indicates calcic carbonate ; filter ; neutralize the solution by ammonia, and add acetic acid in excess ; a turbidity remaining indicates *Calcic oxalate*. To the clear solution (or to the filtrate if calcic oxalate is present) add ammonic oxalate ; a precipitate indicates *Calcium*, which was not previously in the state of oxalate ; filter, if necessary ; add ammonia, and stir ; a white crystalline precipitate indicates *Magnesian phosphate*.

The size of calculi varies much, from the small bodies which appear in the urine, and are spoken of as "gravel," up to masses weighing many ounces. When we consider that all stones originally were small, too much importance cannot be attached to their early detection and treatment. The crushing of a stone that has recently made its escape from the kidney into the bladder is an operation as certain as it is safe ; and after an attack of renal colic, which has probably been caused by the passage of a calculus, unless there is evidence of the stone having escaped naturally by the urethra, the bladder should be explored and the stone crushed. In this way I have on many occasions prevented a renal calculus from assuming larger proportions, and where its subsequent removal would have necessitated a correspondingly more serious operation. I feel sure that the ureter, though so small a tube, is capable of giving passage to calculi of a far greater size than is generally supposed. Here is a specimen which, though weighing 95 grains, almost succeeded in making its way into the bladder.

Those who are interested in cases—which in the present day, owing to the improvements in surgery, are rare—where enormous calculi have been removed by operation, will find

numerous illustrations in the writings of surgeons in the earlier part of this and in the last century. Notably amongst them is one by Mr. Earle, which contains a record of some remarkably large stones.\* The smaller calculi not unfrequently indicate that they are of renal origin, as casts of the uriniferous tubes can be traced upon them. Large calculi require some modification in the mode of effecting their removal, therefore it is of importance to determine their dimensions as accurately as possible.

The shape assumed by calculi is sometimes very remarkable. Here are two specimens which in this respect are almost unique.



Fig. 70.

The first was removed by Dr. Lowndes, from a boy, at the Northern Hospital, and weighs one ounce and half a drachm; the anterior portion of the calculus seems to have been cast within the prostatic portion of the urethra, the urine escaping by the side of it (Fig. 70). The lateral operation was successfully performed. The other specimen (Fig. 71) was removed by Mr. Rushton Parker from a patient who had suffered from stone for a considerable period. Here the calculus appears to

\* "Remarks on the Danger of Extracting Large Calculi," by Henry Earle.—*Medico-Chir. Trans.*, vol. xi.

An account of some very large calculi removed will be found in a quaint old work designated: *A Compleat Treatise of the Stone and Gravel, with an ample discourse on Lithontriptick, or Stone breaking Medicine*. By John Greenfield, M.D., of the College of Physicians, London, 1710.

have occupied the place of the prostate, only the capsule remaining; the urine not, as in the previous instance, escaping by the side, but through a channel in the stone, corresponding in direction with the continuance of the urethra.\* It weighed over nine drachms. The patient made a good recovery. A somewhat similar case is recorded by Mr. Sympson, of Lincoln, where a channel was made in the calculus through which the urine passed.† Examples of incrustations formed on foreign bodies introduced into the bladder, such as pieces of bougie and needles, have already been treated of.

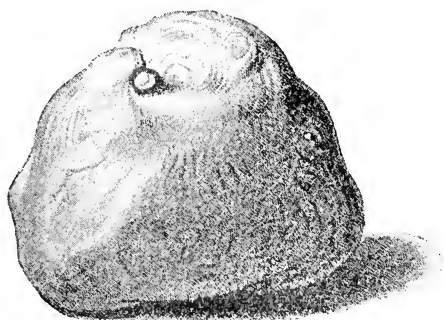


Fig. 71.

I cannot say that I ever met with an instance where there was evidence of a stone being adherent to the mucus membrane of the bladder, but I have seen a case where one of the spikes of an oxalate stone (Fig. 69, upper illustration) was so embedded in the wall of the bladder as to give rise to this impression.

\* *British Medical Journal*, January 19, 1878.

† *British Medical Journal*, March 23, 1878.

## THIRTY-FIFTH LECTURE.

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### STONE IN THE BLADDER—SYMPTOMS AND SOUNDING.

WE will now proceed to consider the symptoms and treatment of stone in the bladder. A stone when it occupies this position usually indicates its presence in a variety of ways, any one of which may be sufficiently significant as to lead the surgeon to determine its presence by actual demonstration with the hand and the ear. A calculus in the bladder is, as a rule, a source of more or less constant irritation; it frequently provokes hæmorrhage, especially after any violent exertion, and it is generally associated with some reflex pain, of which that at the end of the penis is the most constant. Though in the majority of cases these symptoms are more or less combined in varying degrees, we occasionally meet with instances where there is perhaps only one prominent indication. In male children it sometimes happens that constant preputial irritation, or prolapse of the rectum, are the only symptoms suggestive of the presence of a stone in the bladder. An old patient of mine when he first came under observation, only complained of slight hæmaturia after taking a long walk, which he usually did once a week. The constancy of this symptom in connection with the circumstance was suggestive. I sounded him, and detected a uric acid calculus, which was removed by crushing, when the symptom complained of at once disappeared. In like manner we shall not unfrequently meet with instances of stone in the bladder where the symptoms seem not to correspond with what is actually the case.

It is curious to notice that very large stones sometimes

occasion but slight symptoms of their presence. In some cases, where stones weighing many ounces have been removed by the supra-pubic operation, the patients appear to have suffered but little inconvenience from them, probably because by reason of their size the calculi were rendered almost stationary.

As it is important, as simplifying the treatment, to detect the presence of a stone in the bladder in its earliest formation, we should never permit a case of vesical irritability, not otherwise explainable, to go on without subjecting the patient to that method of examination known as "sounding." It is impossible for any one to prophecy from symptoms what a bladder may contain until a sound has been introduced. This is the method of examination which, as a rule, gives us conclusive evidence. I shall presently point out the circumstances under which it may prove fallacious. As the process of exploring the interior of the bladder with the sound is most important, not only relatively to stone, but to almost every other surgical disorder of the bladder and prostate, it will be proper here to devote some little space to its special consideration.

As a rule, I prefer patients who are to be sounded having an anæsthetic, not because the process is necessarily a painful one, but for the purpose of making the examination correct and reliable. If the introduction of the sound indicates at once the presence of a stone, you want to know its size, shape, and probable composition; whether there is one or more; what is the shape of the bladder, and whether the prostate would in any way interfere with the proposed manipulation necessary for its removal. Formerly, when there was only one method of removing a stone, the determination of its presence was the simple preliminary, and its removal by lithotomy naturally followed. In the present day, where the choice of proceeding has been extended, much more precise information is required before we can determine whether the stone in a given case will be more safely removed by a crushing or a cutting operation, and if by the latter, what form is best.

But if the patient does not turn out to have a stone in his bladder, we are none the less dependent on the information which the use of the sound can alone afford for our future guidance. In some cases we have to eliminate the possibility of any disease in the bladder or the parts below, before the physician can undertake their sole responsibility. In others, though there is no stone, there may be tumour, tubercle, or ulceration, which the skilful use of the sound can determine beyond all doubt. Hence, as a rule, sounding must be conducted with that deliberation and design which can only be done where an anæsthetic is employed.

In the selection of instruments for sounding the bladder we all have our little preferences, with which I should not like to interfere. There are small variations in curves and construction, which individuals become attached to by reason of previous good service and the dexterity acquired by long usage. My own sounds are solid steel, nickel plated, of the shape here shewn (Fig. 72).

There is one point in the construction of sounds upon which I insist—namely, that the stem of the largest size shall not exceed a No. 8 English catheter. Some sounds are so thick in this part that they actually *fit* the urethra, and consequently the bulb of the instrument cannot be made to pass as easily as it should do over all parts of the mucous membrane of the bladder, including the dip behind the prostate.

As a rule, sounds are too short. Mine are made not less than fourteen inches in length, so that no matter how large the prostate may be, or how distended the bladder, I can readily feel over the whole area I am desirous of exploring.

A compromise between the microphone and the ordinary



KROHNE &amp; SESELMANN, LONDON

Fig. 72.

sound has recently been suggested by Dr. J. M. Davidson.\* The name of lithophone has been given to this instrument, which is likely to be found useful. It consists of an ordinary sound, with a hollow handle, in which a coil of rubber tubing is inserted. One end of the tube, fitted into an ivory button, is placed in contact with the ear of the surgeon using it, when the presence of very minute particles of stone remaining in the bladder is revealed; another person may use the other end of the tube in a similar manner, and thus impressions be simultaneously conducted to two listeners. Or the surgeon may use the apparatus in the same manner and on the same principle as a binaural stethoscope. Though, in the detection of stone, reliance is mainly to be placed on the educated touch—the *tactus eruditus*—yet, in doubtful cases, advantage may be taken of an instrument such as this, by which impressions are not only conducted, but intensified. It may be used without the tubing as an ordinary sound. †

A careful study of the alterations effected in the passage by which the bladder is entered in prostatic enlargement, as well as of the variations in the form of urethral instruments used under these circumstances, leads me to conclude that, though a certain shaped sound may represent the best average for ninety-five per cent. of the cases requiring such an instrument, yet it is not adapted for the other five, or thereabouts, and that something better might be substituted. Working in this direction, and observing cases in which, by reason of an enlarged prostate, the process of searching the interior of the bladder was rendered more than usually difficult with the ordinary shaped sound, I have been trying several modifications, which have proved efficient.

A long copper probe sufficiently flexible for adaptation to any shape required, is an instrument I have used in cases such

\* *The Lancet*, July 1st, 1882.

† Drs. H. H. Head and R. W. Leftwich have also previously described somewhat similar instruments. *The Lancet*, Oct. 14 and 21, 1876.

as these (Fig. 73). We know how a slight alteration in the curve may make all the difference in the facility with which the bladder is entered when the prostate is enlarged or the prostatic urethra in any way distorted; further than this, the instrument, by yielding a little as it proceeds, enables the surgeon to reach round the prostate without putting the parts so greatly on the stretch as is the case with a rigid steel sound. Bigelow states that he usually searches for a stone with a common tin sound, bent extemporaneously to suit the case. Having at hand ordinary steel sounds of various curves and shapes I find useful, when obstruction at the neck of the bladder is met with from a large prostate I try one or two different curves, with the result generally of discovering one that enters without difficulty. Here is a shape that often passes, and can be rotated easily. (Fig. 74.) Again, I sometimes use flexible sounds tipped with steel; these, though not so sensitive as the metal instruments, have the advantage of adapting themselves to the curvature of the prostatic urethra and bladder, whilst they are still capable of eliciting a "note," and determining the presence of a stone. (Fig. 75.)

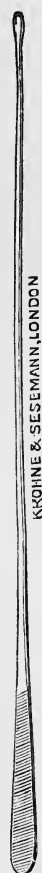


Fig. 73.

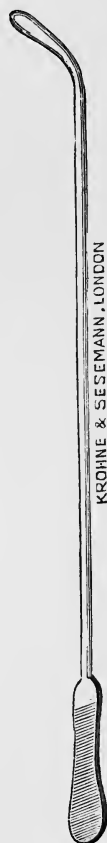


Fig. 74.



KROHNE &amp; SESEMANN, LONDON

Fig. 75.

In detecting stones occupying unusual positions in the bladder, say for instance, above the pubes, I do not know a more valuable sound than an ordinary gum-elastic (old-

fashioned) catheter used without a stylet. I have often demonstrated how readily a stone can be felt with it. Not long ago I saw a gentleman who had been examined for stone by several surgeons; he had all the symptoms, but no stone had been detected. I examined him with a gum-elastic catheter, and at once demonstrated to his medical attendants that there was a large stone lying above the pubes, which proved to be correct. In previous examinations the rigid sound had passed under the calculus, and thus it had escaped detection. The end of the soft instrument curling up as it passed along the wall of the bladder led, as I suspected, to its discovery.

You generally see me pass a whip or soft bougie before introducing the metal sound. By this little device the closed urethra is opened and greased, and the more rigid instrument will then slip in easier; this is equally important, whether or not an anæsthetic is used, as it is desirable that no damage should be inflicted on the parts traversed. Where the prostate is large this object is not so easily attained, and, therefore, these precautions should not be beneath notice.

Hence, I would urge the same caution as in all instrumental examinations of the urethra, such as the passing of catheters and bougies, where a short delay is a matter of no moment. I have known instances where sounding has been followed by urinary pyrexia and death, *post-mortem* examination revealing not only a stone in the bladder, but what had not been previously ascertained, viz., disorganized and suppurating kidneys. I do not mean to say that the sounding might have been dispensed with, but a more complete examination of the health of the whole urinary apparatus would have indicated the degree of risk incurred, and the necessity for additional precaution in preventing ill consequences. When a case is admitted into my wards, my directions are: examine the urine, and then I will sound. When there has been any degree of kidney complication, rest in bed, warmth, diluent drinks, and doses of aconite or quinine, have frequently prevented, or moderated, untoward

symptoms. To always sound persons in your consulting room, probably seeing them for the first time, and perhaps fatigued by a journey, is, to say the least, incurring a risk which is generally unnecessary, and which you may have cause to regret.

In sounding, let it be remembered that the instrument we use is merely an imperfect substitute for the finger, and to obtain the information required it will be necessary to conduct the operation with precisely the same method as we should adopt in the digital examination of any cavity or space in the body which can be so reached. To pass a sound into the bladder, and then indiscriminately wriggle it about with the hope that it may strike a stone or reveal a rugged or ulcerous surface, is a proceeding as hazardous as it is useless. This mode of manipulating you will not employ if you remember that your sound or lithotrite is only an imperfect substitute for the finger.

Should there be a stone, its presence will probably be recognised both by the touch and the ear. A stethoscope applied over the pubes renders the sound more audible, and may be resorted to if there is doubt. The size of the stone can generally be ascertained by the lithotrite, whilst its probable nature is indicated partly by the character of the note that is obtained; the dull "thud" of the phosphates is as characteristic as the sharper "click" of the oxalates or urates; and, further, the examination of the urine often adds evidence which is conclusive. Where there is a suspicion of the existence of a stone, which yet cannot be detected by sounding such as described, it will be well to make an examination on a subsequent occasion, with the patient in a different position. The sound may be passed with the patient standing and leaning forward, resting his hands on the back of a chair, with his legs apart. Again, I have sounded a man lying on his belly instead of his back.

The difficulties which arise in making a diagnosis of stone in the bladder are for the most part traceable to the existence, as a complication, of one of the following conditions:—

First: the presence of a stricture or an enlarged prostate. Second: a diverticulum, or recess within the bladder, in which a calculus may be lodged. Third: the coating of the stone with an imperfectly organised leather-like substance, which conceals it from detection with the sound. Attention has already been drawn to the possibility of an enlarged prostate serving to conceal a calculus, unless special care is taken in sounding to avoid such an error.

As an example of the difficulties arising from the presence of diverticula, or recesses within the bladder, in which a stone may be concealed, I will refer to a case shewn by Mr. Hakes, at the Medical Society, during the session 1863-64.

The patient was an old man, suffering from stone, for which lithotrity was performed; unfortunately the operation terminated fatally. On making a *post-mortem* examination, a sac, larger than the bladder itself, was found, communicating with the floor of the bladder by an opening admitting the little finger. In it was contained a portion of the calculus, broken by the lithotrite.

Such a condition as this might not only account for a calculus being undetected, but would cause serious difficulties in the performance of lithotrity. Digital examination by the rectum, after the bladder had been emptied with a catheter, would probably afford the best means of detecting this complication, should any suspicion of its existence arise. Examination of the supra-pubic region with the hand should also not be omitted. I was reminded of the importance of this on looking through the specimens in the Museum of the City of New York Hospital. Appended to one (784), where there was a sac larger than a hen's egg opening into the bladder near the fundus, in which were several calculi, is the note, "These calculi could not be detected by the sound during life, but the pouch containing them could be felt through the abdominal parietes."

Most of us also, in our experience in the *post-mortem* room, have seen instances where bladders have become so mis-

shapen as to present structural obstacles to the contact of a sound with certain parts of their interior where a stone may be lodged. A structural difficulty in the detection of a stone in the bladder has been illustrated by Mr. Bickersteth,\* in a specimen I examined. (Fig. 76.)

There are probably no urinary cases presenting greater difficulties, both in diagnosing and treating, than those of rugous or sacculated bladders, where phosphatic concretions are deposited on elevated and circumscribed portions of the

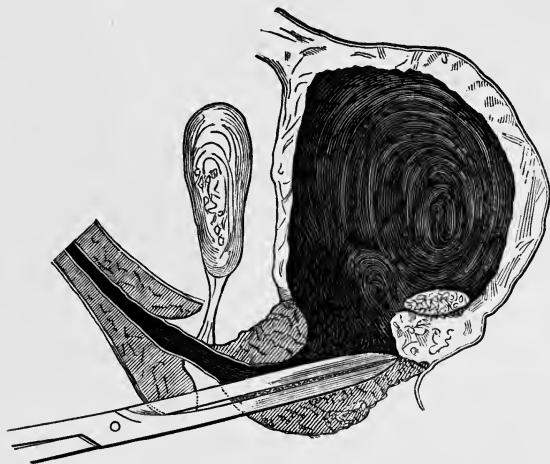


Fig. 76.

mucous membrane. By the sound, something closely resembling a stone may be felt, but the absence of a distinct “ring,” as the instrument comes in contact with the suspicious spot, as well as its fixity in position—unalterable by the use of the instrument, by changes in the posture of the patient, and by distension of the bladder with water—render the diagnosis tolerably easy. I have frequently remarked, in examining the bladders of persons who have died with greatly enlarged prostates, or with saccules or bars across them, how impossible

\* *Liverpool Medical and Surgical Reports*, vol. i., 1867, p. 134.

it would have been, if the cases had been complicated with stone, to detect it with the ordinary sound, provided the stone occupied a position which could be indicated. These are the instances where symptoms are sure to arise, sooner or later, simulating stone, and necessitating an exploration to determine the point.

In the last place, the stone may be so constituted as in itself to oppose a difficulty in detecting it by the means usually employed.

In 1863, a boy was admitted into the Royal Infirmary, under the late Mr. Long, suffering from prolapsus ani, purulent urine, and painful and frequent micturition. He was sounded, but without any evidence of stone being afforded. Death occurred in a few days. On making a *post-mortem* examination, the kidneys were found disorganised. The bladder was small, and contained a calculus, made up of a urate of ammonia nucleus the size of a damson stone, surrounded by a thick layer of soft material consisting of mucus, fibrin, and a little gritty, phosphatic matter. The outer covering could be cut or torn easily; and, after it had been in spirit, it presented, on section, a laminated appearance, like the fibrinous layers of an aneurism. On striking the mass with a metal instrument, no ring was produced; hence the impossibility of determining its existence with the sound during life. The specimen was shewn at the Medical Society by Dr. Rawdon, and is now in the Museum of the Medical Faculty. In the accompanying sketch the nucleus of the stone, with a section of the fibrinous laminae, are seen. (Fig. 77.)

Mr. Bickersteth records a similar instance.

It was that of a boy, who had every symptom of a stone, but in whom repeated examinations gave no clear indication of its presence. When the sound was introduced, I could feel, with my finger in the rectum, some apparent thickening in the posterior part of the bladder. I operated, and extracted a mass precisely similar to that just mentioned (Mr. Long's case), and the child recovered.\*

\* "Observations on Lithotomy."—*Liverpool Medical and Surgical Reports*, vol. i., 1867.

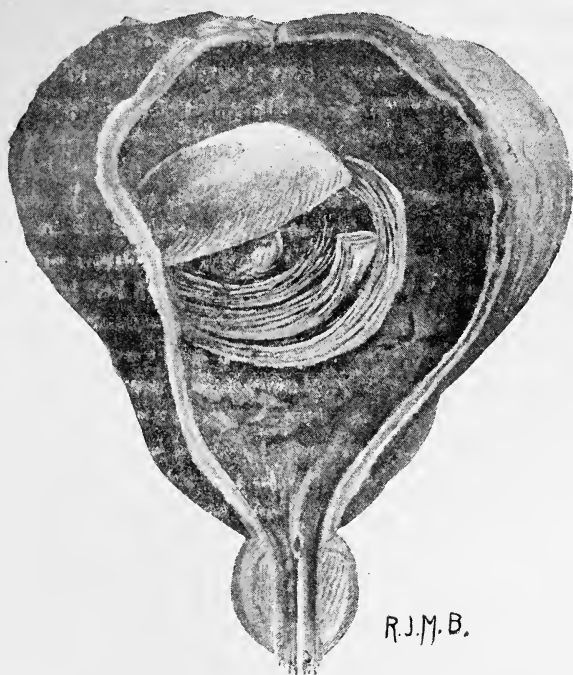


Fig. 77.

The appearance presented by this stone is shewn in the drawing (Fig. 78), to which the following description is appended :  
 “Soft urinary calculus removed by Mr. Bickersteth from a boy ; the soft external coat is shewn cut open, exposing a hard urate of ammonia calculus in the interior.”



Fig. 78.

In the absence of what is regarded as the only positive sign of the existence of stone in the bladder—namely, its detection by the sound—reliance must be placed on other, though less worthy, evidences ; of these, in children (amongst whom only, so far as I know, soft calculi

have been found), prolapse of the rectum, together with signs of urinary irritation, would in the absence of other explanation, justify an exploratory operation. The slight risk attached to the operation of lithotomy in children it would be justifiable to incur where there were reasonable grounds for suspecting that the symptoms might be due to the presence within the bladder of such a calculus as I have described. These, then, are illustrations of some of the difficulties which we may have to encounter in determining the existence of a stone in the bladder.

Where the stone cannot be readily reached with the sound, means may be taken to bring the stone in contact with the sound. This may be done by a device which I first adopted systematically after reading a work by Dr. Freyer,\* where it is remarked: "A most careful search was made by means of sounds of various kinds, but no calculus could be detected till the aspirator was employed, when a distinct click was felt during exhaustion of the water from the bladder, and due to the calculus being carried with force against the eye of the canula by the outward stream. The sound of the fragments clicking against the eye of the canula during the evacuation of the fragments of a calculus, in the operation of litholapaxy, suggested this mode of diagnosis, and I am now in the habit of having recourse to it when the symptoms of stone are well marked, and the sound fails to detect the presence of one in the bladder."

Speaking for myself, I have no means of knowing how many cases of stone in the bladder have escaped my detection; on the other hand, I can only recall one instance where I had reasons to assert with some positiveness, from an examination with the sound, that a calculus was present which on a subsequent examination I was unable to demonstrate.

It was that of an elderly gentleman with an irritable bladder and a large prostate. I sounded him, and obtained what appeared to me to be conclusive evidence not only that he had a stone, but a large one, and

\* *The Modern Treatment of Stone in the Bladder by Litholapaxy*, 1886

that it was situated above the pubes. I advised early operation ; this of course implied a further examination of his bladder under an anæsthetic (which I had not previously used in consequence of the state of the patient's respiratory organs), before the operation would have been actually proceeded with. This was postponed for nearly five weeks, when I was requested to operate in consequence of the great suffering of the patient. I went a considerable distance into the country prepared to operate by lithotomy for stone, but when the patient was fully placed under an anæsthetic, I could find no trace of the calculus. The bladder was, and had been, in a high state of inflammation, and contained the most offensive mixture of pus and urine that I had ever met with. I could find no stone, nor could I determine to my satisfaction the source of the error. Unfortunately, I was unable to give the patient the relief to his inflamed bladder that the removal of a stone would have afforded, and he died in the course of five days afterwards. No *post-mortem* examination was allowed, and I am no wiser as to the circumstances which rendered this case an isolated example in my stone experience.

I think the case is worth recording, as it has its lesson to teach.

Sounding may be practised under the following circumstances, when the cause is not otherwise explicable, or symptoms pointing to the bladder continue in spite of treatment :—

1. In the vesical irritability and incontinence of children.
2. In children suffering from sudden interruption to micturition, from retention of urine, blood in the urine, and penile irritation inducing the pulling of the foreskin.
3. In children suffering from prolapse of the bowel.
4. In the vesical irritability of adults after attacks of renal colic, where there are reasons for believing a calculus may be retained in the bladder.
5. In cases of hæmaturia of a doubtful nature.
6. In pain after micturition, referred to the end of the penis.
7. In cases of chronic muco-purulent or ammoniacal urine, or where the urine contains, on standing, an excess of cloudy mucus.

8. In the enlarged prostate of elderly persons, with persisting symptoms of vesical irritability.

9. Where calculi, or portions of them, have been spontaneously passed, and symptoms of vesical irritability continue.

10. In cases of acute vesical spasm terminating the act of micturition.

11. In cases where, though the bladder contains but little urine, there is frequently a sudden and uncontrollable desire to micturate.

Though the indications of stone may be numerous, it will be seen that they all have reference to either (1) a persisting source of irritation within the bladder, or (2) mechanical interference with the act of micturition. The smaller the stone, the slighter are the symptoms it usually produces, but the greater is the necessity for their early recognition.

## THIRTY-SIXTH LECTURE.

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### LATERAL LITHOTOMY.

THE operative treatment of stone in the bladder is so extensive a subject that I cannot hope to do more in this course than to make some clinical observations relative to it, based upon my personal experience.

Lithotomy is one of the few operations in surgery in which from first to last there need be no change in the way the knife is held by the surgeon. It should be held as represented (Fig. 79). No other position permits the freedom of movement

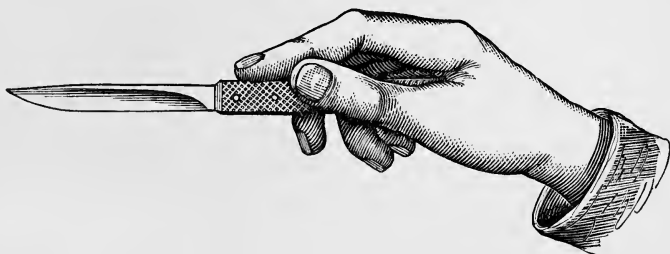


Fig. 79.

which is necessary to the dexterous execution of the proceeding. Commencing about an inch in front of the anus, the point of the knife should be steadily directed towards the staff, with the view of touching it in the membranous urethra, below the line of the bulb, the incision being enlarged downwards and outwards to the extent of about two inches, or even more should the size of the stone require it, as the knife is withdrawn. It is assumed that the surgeon has been able to form a tolerably accurate notion of the size and constitution of the stone to be removed. If the incision is fully made, both in depth and direction, the staff will at once be felt by the finger of the other

hand, or be so nearly bared as only to require a touch or so with the point of the knife. The bladder is then opened by cautiously pushing on the knife in the groove of the staff, the edge being directed obliquely outwards, so as to incise the prostate in a direction corresponding with its greater bulk.

Various modifications have been made in the staff which guides the knife into the bladder after the perinæum has been opened. Much has been said in favour of the rectangular staff introduced by Dr. Andrew Buchanan in 1848 (Fig. 80), on the ground that it facilitates the steps of the operation by substituting a straight for a curvilinear groove in which the point of the knife runs. Though I have seen surgeons cut with much dexterity on the rectangular staff, I have never felt tempted to forsake the curved one with the slightly lateral groove. Habit, undoubtedly has much to do with the acquirement both of confidence and dexterity. Not many surgeons would prefer to cut for stone with the lithotome (Figs. 81 and 82), yet my friend Dr. Alan P. Smith,\* of Baltimore, attributes a large amount of his success to its use.

I do not remember ever having much difficulty in reaching the groove in the curved staff, and therefore I may be excused for not admitting that the operation is simplified by an angular instrument. Though referring to my own preference in the selection of a staff, I have no wish to undervalue an



Fig 80.

\* A Report of fifty-two successful cases, *Trans. Med. and Chir. Faculty of Maryland, U.S.A., 1878.*

instrument the principle of which has been approved by such practical surgeons as Professors Annandale and George



Fig. 81.

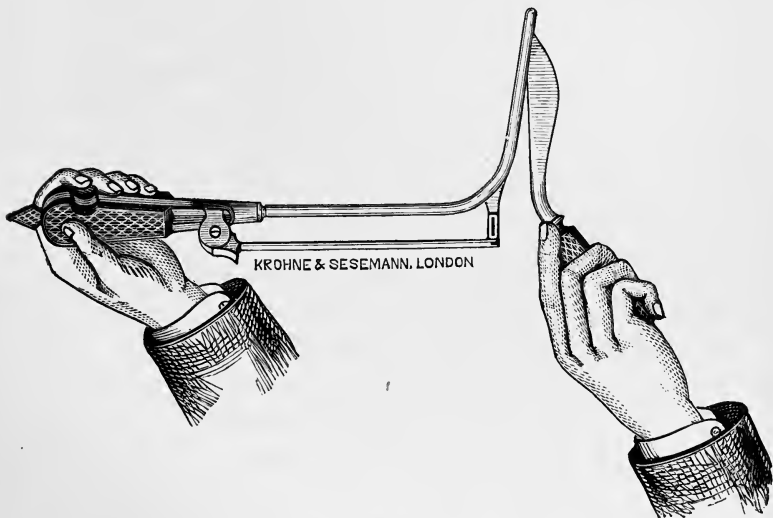


Fig. 82.

Buchanan, in addition to other practitioners who, to my knowledge, employ it.

The long beaked staff described by Dr. J. Ward Cousins \*

\* *British Medical Journal*, vol. ii., 1882.

evidently possesses several advantages. I have found the best shaped staff for ordinary purposes to be that represented in Fig. 83. \*When used for very young children, in whom the bladder is an abdominal rather than a pelvic organ, it must be held more obliquely than in the adult; otherwise, as the curve is a short one, the extremity of the staff may hardly be within the bladder.

A rule I have already mentioned—namely, to endeavour to touch the staff with the point of the knife as the first incision into the perinæum is made—has, so far, saved me from all difficulty in making the deeper one. We sometimes hear of cases in which the bladder has not been reached. This could hardly happen, assuming the staff to be correctly held, if, after the perinæum is opened, the index finger of the operator's left hand (the right hand being occupied by the knife) is confined to *gently feeling* for the staff, or protecting the rectum from risk or injury. When the first incision penetrates but little beneath the skin of the perinæum (as often occurs in first operations), the distance to the staff appears so great that a process of boring or tunnelling with the finger towards the staff, rather than cutting with the knife, sometimes ensues. If this is continued, either the operator is landed between the bladder and the rectum, or the urethra gets torn across, and the way to the bladder is lost. When the staff is *felt* to be bared, then the nail of the left index finger serves as a guide for steadying the point of the knife in the groove prior to the commencement of the deeper incision. It will be observed that no attempt is made to dilate the urethra with the finger for the purpose of entering the bladder.

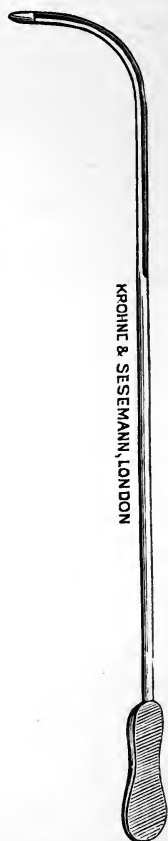


Fig. 83.

It may seem superfluous to refer to minutiae such as these, but my own experience, in addition to that which I have derived from watching other operators, leads me to the conclusion that the reaching of the staff, and the insertion of the point of the knife in the groove, are the anxious parts of this proceeding, and that it is impossible to be too explicit in mentioning details which have proved of practical importance. In those unfortunate cases, happily rare, where the operation has broken down at this stage, and the patient has been removed from the operating table with the stone still in his bladder, I believe I am correct in stating that a fatal result has almost invariably followed. Such, at all events, has been the termination in the few instances of the kind which have been communicated to me. Hence the importance of a careful study of all details which may be considered as contributing towards success.

The deep incision along the groove in the staff should be made sufficiently free, so far as the prostate is concerned, to permit an average-sized index finger to enter the bladder with tolerable ease, whilst, on the other hand, it must stop short of a complete section of the part.

It will be remembered that the introduction of the finger into the bladder is one of the conditions of the operation of lithotomy, whether performed in the child or adult, and there need be no difficulty in determining the precise means by which this object may be obtained with the least amount of risk. In the adult, if, when the perinæum has been opened, the handle of the staff is held vertically whilst the blade of the knife is pushed on towards the bladder, nearly parallel with the direction of the groove in which it is lodged, no fear need be entertained of exceeding the proper limits of an incision into the prostate. If, on the contrary, the handle of the staff be too much depressed, whilst at the same time the *point* alone of the knife is carried along in the groove, the range of the incision may become so extensive as to include more than the prostate in the section. In this way, not only has the muscle and its capsule

been cut completely through, but even the trigone has been invaded.

Or the matter may be put as follows :—At the close of the incision into the prostatic urethra, the relation of the back of the knife to the groove in the staff should be that represented by nearly parallel lines, or, at the most, a very slight angle. Provided this position be maintained, and the point of the knife be steadily kept in the groove, there will be little risk of exceeding the safe limits of an incision, even though the knife be pushed, as it need not necessarily be, to the end of the groove in the staff. If the staff is fairly well hooked up under the arch of the pubis, its beak will be some distance above the floor of the bladder. The point of the knife should under no circumstances be allowed to leave the groove in the staff, otherwise parts may be invaded which should not be touched, and serious hæmorrhage caused.

My reason for alluding to these points is, that surgeons undertaking lithotomy on the living subject for the first time frequently ask what are the rules for placing a safe limit on the deep incision by which the bladder is entered. The answer that would probably be given by those who have learnt from experience how to conduct this operation, is to the effect that they are guided at this stage of the proceeding by the degree of *resistance* they find it necessary to overcome—an answer which, though correct, is unsatisfactory to the novice who, under the term “resistance,” suspects the possibility of the inclusion of structures which are to be avoided. I have endeavoured, therefore, to indicate that, in ordinary cases of lithotomy, regard to certain considerations and positions will free the operator from incurring the risks which he may anticipate, but seldom realises.

When the finger is in the bladder, it is easy to extend the incision with a probe-pointed knife, should dilatation not suffice either for introducing the forceps or extracting the stone. If the opening will not allow of the easy passage of the forceps *into* the bladder, it is not to be expected that they can be

withdrawn with a stone between their jaws, without inflicting unnecessary damage to, if not tearing, the parts constituting the neck of the viscus.

To anyone practically unacquainted with lateral lithotomy it may appear that attention to the many details it includes must necessitate some time to be taken up in its performance. Such, however, is not the case; and though care is to be commended rather than speed, there is nothing in cases free from complication to prevent the operation being safely accomplished in a few seconds. Rapidity in manipulation must, however, come naturally, rather than be aimed at. The object of the operator is to extract the stone from the bladder without exposing the patient to unnecessary risk, and so long as the surgeon accomplishes this, he may regard the time occupied, whatever it may be, as well spent. It is not my custom to inject water into the bladder before operating, or to give any special direction with the view of having urine retained in anticipation. An empty and, if possible, a contracted rectum should be secured. The close relation of the rectum, when distended by fæces, with the upper portion of the urethra is shown in Fig. 84,\* drawn from a frozen section specially prepared for the purpose.

A curved and a straight pair of lithotomy forceps should be at hand; and, in removing the stone, only gentle traction forwards and slightly downwards is to be exercised. Angular stones, or those with spike-like processes, are sometimes more or less embedded in the walls of the bladder (Fig. 69). When this is the case, the position of the calculus must be altered before it can be withdrawn by the forceps, otherwise the floor or neck of the bladder may be torn. I have known stones rendered stationary in this manner spoken of as being adherent to the walls of the bladder, such a connection being, of course, only a mechanical one. A scoop and a Higginson's syringe for washing out the bladder through the wound, are sometimes required when the stone breaks on being seized with the forceps.

\* Braune's *Topographical Anatomy*.

Professor Humphrey seems to have a preference for the scoop.\*

When the stone is large, too large to come away without the

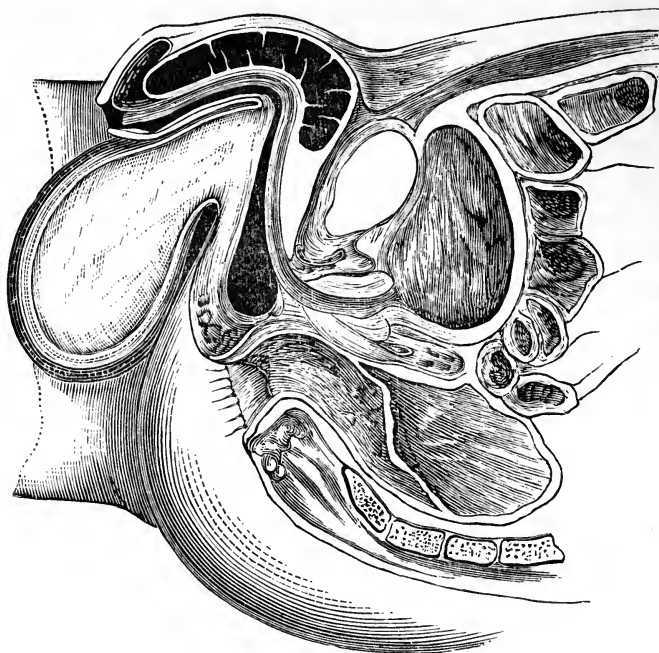


Fig. 84.

exercise of such force in extraction as might tear—not stretch—the neck of the bladder, a corresponding incision on the opposite

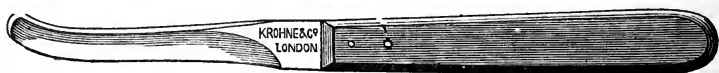


Fig. 85.

side of the prostate may be made with a straight probe-pointed knife (Fig. 85), on the operator's left index finger passed fairly within the bladder, should an extension of the existing incision

\* *The Lancet*, June 1st, 1872.

be insufficient. On three occasions I have thus made a bilateral incision with success. In one instance where it was employed, it permitted me to remove, without hæmorrhage, a prostatic tumour (an adenoma), in addition to an oxalate stone weighing nearly three ounces.

If from its shape or size there may be doubt whether a stone can be brought out safely through a perineal incision before opening the bladder above the pubes, it is worth consideration whether, from an examination of the stone with the finger, it would be feasible to crack it across and remove it piecemeal. For this purpose Messrs. Krohne & Sesemann have made me a pair of strong lithotomy forceps, with a cutting rib down the centre of the blades, with which (Fig. 86) such a proceeding can be effected.

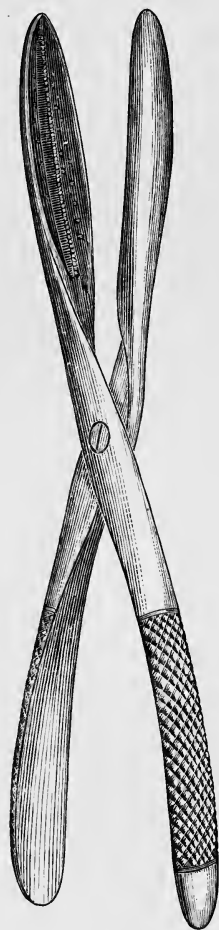


Fig. 86.

The accompanying diagram (Fig. 87) is a representation of a vertical section of a frozen prostate taken from a healthy man, aged thirty-five. It is introduced for the purpose of indicating the extent to which the part may be incised in various directions, shown by the black lines, and the probable amount of room that such incisions would afford. Such a diagram can only be regarded as having a relative value as it represents the contracted condition of the prostate, and, consequently, one which seldom presents itself to the practical lithotomist.

After a stone has been extracted, the bladder should be carefully searched to ascertain that it is clear. The index finger is the most trustworthy explorer, aided by downward

pressure with the other hand above the pubes. If these means be found insufficient, an ordinary sound may be introduced through the wound.

Formerly my practice was not to introduce a tube through the wound into the bladder after the operation, but now I recognise that this procedure possesses an advantage other than that of preventing clots obstructing the free discharge of urine. By attaching a piece of rubber tubing to it, a considerable portion of the urine may be conveyed into a receptacle by the bedside, and the patient thus be kept drier and more comfortable. In introducing tubes into the bladder after lithotomy, care must be taken that they are passed along the wound into the viscus and not into the cellular tissue between the bladder and rectum.

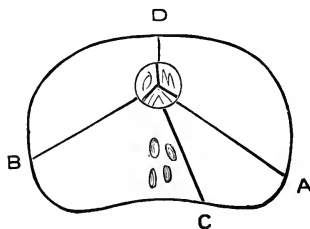


Fig. 87.\*

The treatment of immediate and secondary hæmorrhage in cases of lithotomy, prostatotomy and cystotomy, has given me much consideration, as instances of these complications have from time to time arisen. When an artery has been divided, and is evidently spouting, it must be tied; this can generally be done with the aid of retractors without much difficulty; to plug a spouting vessel, if it is possible to avoid it, is to court the recurrence of a bleeding. More usually I have noticed, as in section of the prostate and adjacent parts, this

\* A. Lateral incision.

A.B. Bi-lateral do.

C. Downward do.

D. Upward do.

bleeding is of a freely oozing nature, as if from spongy textures, but in this way many ounces of blood may be quickly lost. I have invariably noticed in the cases referred to, when the bleeding has been of this oozing nature, how easy it is to control it with the point of the finger introduced and carried well into the bottom of the wound, sometimes even by the finger in the rectum. For the finger in the wound I now substitute a lithotomy tube of a size which fits the wound in the bladder that has been made. The drawing (Fig. 88) represents the size of one of the tubes I employ. I have them made of different calibres, so that they may fit with tolerable accuracy. They are tied into the bladder by the usual perineal band, and drainage through them is carried on by the inner rubber tube, which can be changed at will, and by which the bladder is washed out and the urine carried into a vessel by the patient's bedside.

These tubes have now been tried on several occasions, with entire success. If I am at all doubtful about bleeding, I introduce one of them, and retain it for twenty-four hours or so, according to circumstances. Since I have used them, I have had no fear or trouble in dealing with primary or secondary hæmorrhage, either in lithotomy or in some of the deep sections of the prostate or prostatic bars I have made. It has, in fact, proved a reliable plan of exercising digital compression on bleeding vessels, which cannot be tied, and where styptics of all kinds are undesirable. These tubes can be readily removed; thus the wound is kept clean and free from the collection of septic influences. Though the size of these tubes may be taken as representing considerable openings into the bladder, I do not think exception can be taken to them on these grounds. When the proper time arrives for closing a bladder, which, in its construction, provides cause for the production of stone, for the maintenance of cystitis, and the symptoms that one or other of these, conjointly or independently, produce; when urine escapes from the open bladder with an acid, and not a foetid alkaline reaction, then it will be found that a large opening heals quite

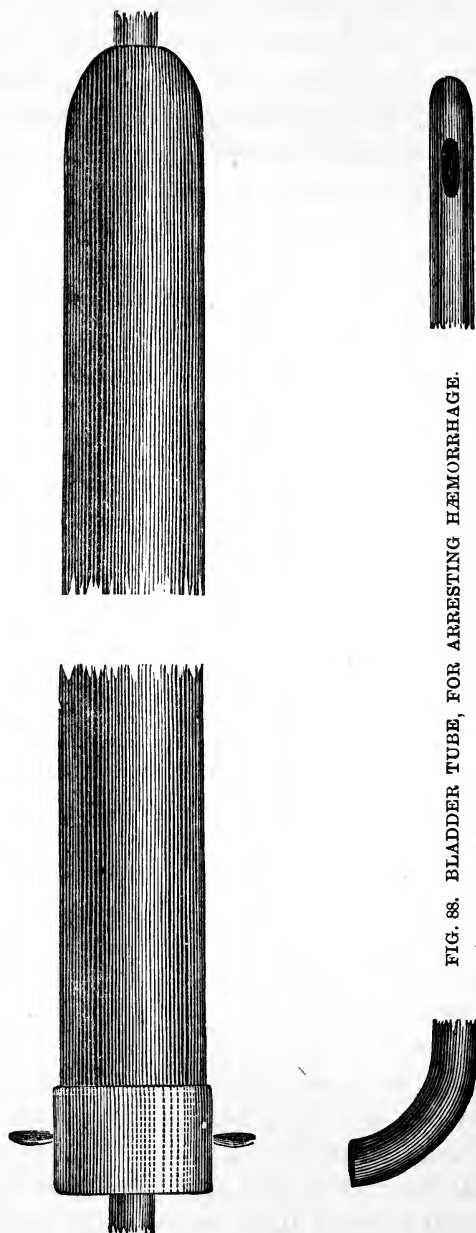


FIG. 88. BLADDER TUBE, FOR ARRESTING HÆMORRHAGE.

as quickly, and much more soundly relatively to the parts above it, than a small one. In adjusting these tubes after lithotomy, I have recently adopted the practice where there has been any oozing of blood from vessels which cannot be tied, of temporarily closing as much of the wound as possible above and below the tube by one or two wire sutures introduced as deeply as I can. In this way the wound is completely sealed without the possibility of there being any retrograde hæmorrhage into the bladder. Both in perineal sections for stricture and pros-

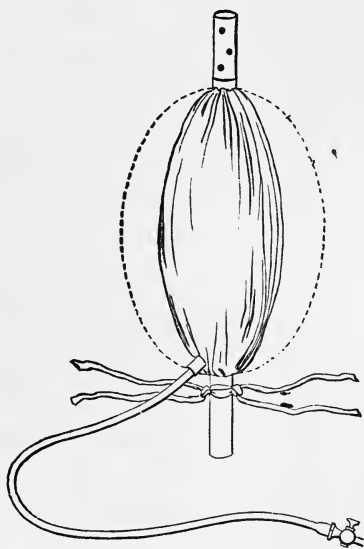


Fig. 89.

tatotomy as well as after lithotomy, I have found the use of sutures in connection with these large drainage tubes of much advantage. For a similar purpose I formerly used Mr. Buckston Browne's dilatable tampon. (Fig. 89.)

When the artery of the bulb has been divided, I have never seen any difficulty in securing it with forceps and a ligature, if the perinæum has been sufficiently opened, and not merely stabbed; nor do I remember circumstances arising which

caused me to stop to take up bloodvessels, or otherwise to arrest hæmorrhage, until the operation was practically over. This necessity, however, might arise if, for any reason or other, there were delay in reaching the staff and completing the deeper incision. After the stone has been removed, the patient should not be sent to bed until the wound has been thoroughly searched, with the assistance of retractors if necessary, and all the bleeding vessels tied.

In reference to the after treatment of lateral lithotomy there is very little to be said apart from what applies equally to all operations in surgery. A well performed uncomplicated case of lithotomy may be said to require no treatment at all beyond what is implied in the words cleanliness, ventilation, drainage, and proper feeding. In this respect the lateral procedure differs importantly from other operations practised for a similar object but differently executed. As neither the bladder nor superficial parts are sutured there are no stitches to take out, no question arises as to whether a catheter should or should not be used, and there is no risk of extravasation of urine going on in parts where it cannot be readily inspected. If the surgeon accomplishes his part correctly, nature as a rule, may be left to complete the task almost unaided by art. The drainage of the wound is sometimes favoured by slightly elevating the head of the bed, say, by placing a deal board, two or three inches in thickness, beneath the legs supporting this part. The patient should be kept dry by a constant supply of draw sheets; this object may also be aided by keeping a good sized sponge, frequently wrung out in warm carbolized water, in close contact with the wound. The food should be light and unstimulating, and of such a character as not to require an action of the bowels for a week. The first movement of the bowels, if not spontaneous, should be favoured by the administration of a warm water enema, carefully given. One of the few cases of secondary hæmorrhage after lithotomy I have seen was directly traceable to an acute attack of diarrhœa, provoked by the patient being

surreptitiously supplied with unripe fruit almost immediately after the operation. It seems remarkable that one should have to refer to such improprieties as these in connection with a serious surgical procedure.

I seldom wait for the wound to close before allowing the patient to sit up ; my cases are frequently placed in an easy chair at the end of the second, or in the course of the third, week. I have never found this position interfere with the healing of the wound. When all risk of bleeding is at an end, there is no object in the patient being confined to bed. In cases of lithotomy in old subjects, I am sure it is of great importance to get them up as soon as it can be safely done. Urine usually begins to flow through the urethra about the tenth day, the first discharge *per viam naturalem* not unfrequently being followed by a chill or rigor, which, so occurring, need not occasion alarm. I allude to this, as it is about the only rigor following an important operation which is not to be regarded with a grave suspicion that it may forbode something worse.

## THIRTY-SEVENTH LECTURE.

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### SUPRA-PUBIC CYSTOTOMY.

SINCE the second edition of these lectures was published the high operation, or as it is more commonly called, supra-pubic cystotomy, has again come into vogue in connection with the treatment of tumours and stone in the bladder. It will be convenient to give it our consideration in this place in connection with the surgical treatment of calculus, so that when I come to speak of it in its application to tumours of the bladder it will only be necessary to point out any modifications in the procedure that may under such circumstances be required. I shall first of all refer to the details of the operation itself, and then consider what appears to me to be its advantages and its drawbacks.

It owes its recent revival in a large measure to the observations of Garson,\* the practice of Petersen † of Kiel, and the advocacy of Sir Henry Thompson. ‡ The fact that the bladder is usually uncovered with peritoneum immediately above the pubes, has for a long period been rendered available by surgeons for tapping with impunity in cases of retention of urine. To increase this area, and to permit the bladder to be opened, and stones removed without injuring or invading the cavity of the peritoneum is the chief feature in Petersen's mode of performing the high operation.

\* *Edinburgh Medical Journal*, October, 1878.

† *Archiv. für Chir. Chirurg.* vol. xxv, 1883.

‡ *The Supra-pubic Operation of Opening the Bladder.* London, Churchill, 1886.

This is accomplished by moderately filling the bladder with a warm solution of boracic acid, or some bland antiseptic fluid, and by distending the rectum in the adult with a pear-shaped bag containing from eight to twelve ounces of fluid, so as to cause the bladder to rise into the abdomen, and thus to increase the interval above the pubes where it is uncovered by peritoneum. The vertical limit to which this area may thus be artificially extended has been variously stated, but, as a rule, from two to three inches may, with a moderate amount of distension, be depended upon. The bladder having been distended and made prominent, in accordance with Petersen's directions, a median incision, about three inches in length, is made immediately above the pubes through the skin and cellular tissue. The dissection down to the bladder wall will best be carried on with forceps and a blunt director, as many large veins will often be encountered and should be pushed aside. It is a mistake to suppose that the liability to hæmorrhage is not considerable in this operation, though with ordinary precautions no danger need be apprehended. This is mentioned merely for the purpose of putting the operator on his guard. In cases recently recorded by Dr. Hume\* it is remarked, "the veins in front of the bladder were larger and more engorged than was to be expected; and their walls seemed friable, so that they were torn even with the gentlest handling. Bleeding was thus a troublesome feature of the operation, and some time had to be spent in arresting it." This condition of the veins in front of the bladder probably also explains the free secondary hæmorrhage which has been met with after this operation. The distended bladder having been exposed and commanded with a hook or tenaculum, an incision is made into it sufficient to permit the entrance of the index finger. In women after the bladder has been distended, the fluid may be retained by the finger of an assistant compressing the urethra against the pubes. Where the stone is small, it may be removed between the fingers; where large, a pair of

\* *The Lancet*, Jan. 15, 1887.

forceps must then be introduced. In a case recorded by Dr. Morison,\* the stone was so large that it had to be removed by a pair of midwifery forceps. The stone having been removed, the method of dealing with the bladder wound will then have our consideration.

In children, it seems likely that by an accurate closure of the wound, both in the viscus and in the abdominal parietes, immediate union may be obtained. This has been well illustrated by a case of Sir William Mac Cormac's.† On the other hand, in adult males we must remember that not only is such an event improbable, but there is some risk of extravasation of urine taking place in front of the neck of the bladder, in the space which has already been referred to as the porta vesicæ of Retzius. The risk of urinary extravasation after supra-pubic cystotomy in male children does not appear to be so great as in adults, a fact which is probably due to the somewhat different position of the viscus at these two periods of life. In male children, after supra-pubic cystotomy, I should advise the accurate adjustment of the bladder wound with catgut sutures, and the separate closure of the parietal wound with the use of a drainage tube, and an iodoform dressing. In young children it is, I believe, better to dispense with the catheter, and to depend upon the accurate adjustment of the bladder wound by sutures. In adults I should leave the wound in the bladder, as well as in the parietes, open, though the latter may be reduced in size by the insertion of one or two sutures. The drainage of the wound will be assisted by keeping the patient lying well over towards his abdomen. Care must be taken in watching the thermometer as aiding in indicating whether urine or matter is pent up; if there is any suspicion of this, all sutures that may have been introduced must be promptly removed. This is probably the only risk of any importance after this operation, where sutures have been used for closing either the deep or superficial incision.

\* *British Medical Journal*, Oct. 2, 1886, p. 622.

† *The Lancet*, Sept. 25, 1886.

In the adult male, where the bladder has been chronically inflamed and the urine is ammoniacal, the chances of obtaining primary union of the wound are very remote. Where these conditions are not present, a rapid healing of the incision may be obtained. In a case recently recorded by Mr. Bond,\* it is stated :—

The patient, a very stout man, of 48 years of age, was operated upon by the supra-pubic method, and a uric acid stone, measuring  $1\frac{1}{2} \times 1\frac{1}{2}$  inches, was easily removed. The bladder wound was closed with sutures, and on the fourth day, in spite of some urine having been driven out by the violent contraction of the bladder, the wound was healed.

Mr. Bond remarks :—

In settling the important question, whether after supra-pubic lithotomy the bladder wound should be left open and a tube placed in the bladder, or whether it should be sutured and primary union attempted, I think the condition of the urine may be a guide ; if that be healthy, other things being equal, primary union will probably result after careful suturing ; it seems better to pass a catheter frequently than to leave one in the bladder.

It must not entirely be lost sight of that, as in other wounds involving the abdominal parietes, the incision for supra-pubic cystotomy may be followed by the formation of a ventral hernia. This, however, is a contingency so remote, so far as my observation has gone, as hardly to be reckoned against this operation should it be otherwise indicated. Upon this point, however, I think we require some further information which will probably be forthcoming now that the high operation is more frequently employed.

I believe that in some cases where there has been a difficulty, by reason either of its shape or size, in removing the stone through the supra-pubic incision, much damage to the bladder from manipulating the stone in the forceps, and ineffectual

\* *The Lancet*, Feb. 5, 1887.

attempts to extract, might have been averted by making, in addition, an incision as for median or lateral cystotomy, by which the position of the stone could be altered with the finger from the perineal wound, whilst the forceps were applied through the supra-pubic opening. In this way the lever and the forceps could be advantageously combined for a common purpose. Several cases of supra-pubic lithotomy have proved fatal by damage inflicted on the bladder—an accident which might have been avoided by a more accurate adjustment of the stone to the extractor. As bearing upon this practice, I will quote from a case of lateral and supra-pubic lithotomy recorded by Dr. A. Paterson.\*

The lateral incision having been made, “on introducing my finger, I at once expressed a doubt as to the possibility of safely removing the stone by this incision, due not so much to the size of the stone, though large, as to the extraordinary sharp spicular surface which it presented. The original wound was cautiously enlarged by means of a probe-pointed bistoury, but the inevitable extensive laceration and bruising which must have attended removal induced me to desist from any further attempt to extract it in that situation. An incision in the median line was now made, three inches in length, just above the pubes, and by careful dissection the reflection of the peritoneum was exposed and held back; then the upper part of the anterior wall of the bladder was divided, and the stone easily grasped by the forceps. The greatest difficulty was experienced here, and it was only after introducing a scoop, and levering it, that the stone was at length extracted. The extraction was assisted by a finger placed in the rectum supporting the calculus. The edges of the supra-pubic wound were brought together, and a drainage-tube inserted.”

The thorough manner in which the double wound permitted drainage to be carried out—a point of considerable importance in the after-treatment of lithotomies where very large stones have, as it were, made beds for themselves, in which they have lain—no doubt contributed to the successful issue of this case. Seventeen days after the operation the patient was well, passing

\* *Glasgow Medical Journal*, April, 1882.

all his urine through the natural channel. The calculus measured six inches in its long circumference, and five and a half inches in its short.

In reference to the making of two openings into the bladder to meet special circumstances, I quote the following passage from a recent author: \*—"It is said of Frère Côme (1758-1778), whose high operations for stone were so successful, that, in order to prevent urinary infiltration, he was in the habit, before performing epicystotomy, of opening the urethra in the perinæum. The value of perineal drainage was also appreciated by Civiale, who, according to Bransby Cooper (Coulson, p. 475), while engaged in the high operation for stone, accidentally wounded the peritoneum, and fearing extravasation of urine into the peritoneal cavity, opened the bladder through the perinæum, and the patient recovered."

Dr. Howe,† of New York, records a case where he thus successfully removed a stone from the bladder weighing 3,541 grains.

The patient was only sixteen years of age. A supra-pubic and a perineal incision were made, through the former of which the stone was extracted, great assistance being at the same time rendered by the index finger passed into the bladder through the perineal opening. Dr. Howe observes, "From a careful study of this case, and from an examination of the records of the extraction of large calculi through the perinæum and rectum, I am convinced that the supra-pubic operation is the only safe one. The stone can be removed without lacerating important organs. Free drainage can be kept up through a perineal opening, as well as through the lower extremity of the abdominal incision, thus reducing to a minimum the danger arising from urinary infiltration and peritonitis."

Dr. William Gardner,‡ of the Adelaide Hospital, has also recently recorded the case of an adult male, where, on finding from a lateral perineal incision that the stone was too large for removal, in this way he performed a supra-pubic incision; elevating the bladder by a

\* *A Study of Tumours of the Bladder*, by Dr. A. W. Stein, New York, 1881.

† *New York Medical Journal*, Feb. 17th, 1883.

‡ *The Australasian Medical Gazette*, Sydney, December, 1886.

Barnes's bag containing eight ounces of water introduced into the rectum. A short curved sound was then passed in through the perineal wound, and on the turned-up beak the bladder was incised and the sides grasped with forceps. The lateral incision seems to have rendered good service in this instance in permitting a thorough exploration of what proved to be a large rugose oxalate stone, in favouring the manipulation for its extraction above the pubes, and subsequently in providing a dependent channel for drainage. The stone weighed six ounces and twenty grains. The patient recovered well from the operation, but, as I have been kindly informed by Dr. Gardner, he died four months afterwards from epithelioma of the bladder, the perineal and abdominal cicatrices being also involved in this disease.

My personal experience of supra-pubic lithotomy has been so limited that I should not venture to speak of it, did I not feel that, though small, it related to the consideration of the whole subject of removing those stones from the bladder which lithotripsy could not be made to include. On the other hand, my experience of lateral lithotomy has not only been considerable, but has given results which make me view with some apprehension the proposal to revive, with what seems to me but little discrimination, the supra-pubic operation. Whilst admitting all the advantages claimed for Petersen's method, I would still limit its performance to those cases beyond the reach of lithotripsy, where the relations of the stone to the pubic arch were such as to render extraction by this way without damage to the adjacent parts obviously hazardous, and in the female to those cases where Bigelow's proceeding was inapplicable. I do not think it possible to define closer than this. In the extraction of some foreign bodies, and for the repair of injuries thus inflicted on the coats of the bladder it is probable that the supra-pubic proceeding may have decided advantages over other ways of reaching and exploring the interior of this viscus.

My reasons for urging that the supra-pubic operation should be reserved for those stones which in our individual judgment appear to be beyond removal, with safety to the surrounding

parts, by the perineal method, partly arise from a consideration of some of the conditions under which Petersen's operation may be performed, and the experience we already possess relative to the performance of lateral lithotomy as at present practised. Of all the contingencies an operator has to calculate upon and provide against, the most embarrassing is the consciousness that he may find such an anatomical disposition of the parts as to render the completion of the contemplated proceeding impossible. The reflection of the peritoneum has been found so low down as to render it impossible to open the bladder without entering the peritoneal cavity.\* I cannot recall any contingency of this nature which might not be provided against beforehand that has ever led to the lateral operation having to be abandoned. Again, I do not think that Petersen's operation is entirely without special dangers other than those connected with an abnormal reflexion of the peritoneum. Our experience of Petersen's method has so far been comparatively limited. Let me illustrate my point in another way. A patient with a stricture and a distended bladder was placed on the operating table of Bellevue Hospital for the purpose of having his stricture relieved.† Whilst struggling under ether the abdominal tumour suddenly disappeared, and the former area of dulness became tympanitic. At a *post-mortem* examination the bladder was found ruptured, without ulceration or other alteration. No doubt the distension in this case was considerable, as two quarts and a half of bloody fluid were found in the abdomen. When, however, we consider the condition of distension, so far as both the bladder and rectum are concerned, in Petersen's proceeding, I cannot think, from the descriptions I have read, that we are entirely free from the possibility of such an accident occurring in the case of an atonic or weakened bladder which might have not been realised beforehand.

\* Polaillon: *The Lancet*, Jan. 30th, 1886. Autal: *Medical Chronicle*, March, 1886.

† Dr. Cruise: *New York Medical Record*, Aug. 1st, 1881.

Passing to our experience of lateral lithotomy, let us see for a moment what is our position. In young male children a well-executed lateral lithotomy may be regarded as an extremely safe operation. Many surgeons I could mention have practised it a considerable number of times without a fatal result. It leaves no permanent weakness or imperfection behind. Why should we wish to change it other than on the somewhat questionable ground that to some the change may prove more convenient? Passing to the adult, we are left in the present day, thanks to the progress lithotripsy has made, with a small residuum of cases which this operation cannot cover. And this residuum is practically made up of three groups of cases: (1) cases where the stones are too large to come out except through the abdomen; (2) cases of stone where the condition of the prostate is such as to demand some special attention; (3) cases of stone complicated with diseased or distorted bladders requiring drainage. I do not think that examples of these three conditions will be wanting in the practice of most surgeons. Of these three groups the first is provided for by supra-pubic cystotomy. I have already illustrated the second class, where patients were relieved not only of the symptoms which stone caused, but also of those produced by these large growths. Passing to the third class of cases, where the bladder requires not only the removal of the stone but draining, I would illustrate this in the following way. During the last two years two patients came under my care, one who had undergone the crushing operation twice and the other thrice, at comparatively short intervals of time. In both the operation could only be regarded as partially successful; both seemed to me to suffer almost as much without stones in their bladders as they did with. I cut and drained both, and the patients are now, I believe, and have been since the operation, perfectly well. Though lithotripsy was successful in each, lithotomy was more so. I cannot, under the circumstances referred to in the last two groups of cases, admit that I could have obtained equally

satisfactory results by an opening made into the bladder above the pubes.

We have, I think, sufficient evidence to show that the last few years have not been uneventful in the history of perineal lithotomy. We have learnt to define pretty accurately what cases are best met by crushing and what by cutting. We have improved our means of arresting any hæmorrhage that may follow the latter proceeding. Means have been methodically and successfully introduced for dealing with some states of the large prostate when it complicates stone. We have recognised the importance of bladder drainage as a necessary part of the after-treatment of some cases of lithotomy, and suitable appliances have been introduced and accepted for this purpose; and, further, the essential details of Listerism have been applied to these operations. Instead of aiming to change our ground and to substitute an abdominal for a perineal section, save under exceptional circumstances, I think we shall find it more advantageous if we endeavour to add further improvements in the directions I have ventured to indicate, in the perfecting of an operation which, of all others, so entirely depends on the precision and dexterity with which it is executed.

Undue prominence has, in my judgment, been given in the discussion as to the relative advantages of the high and low operations for stone, to the possibility of injuring the seminal ducts in the operation of perineal lithotomy, and of thus unsexing the individual. Such a statement is, I believe, unsubstantiated by anything like adequate proof.

Upon this point Mr. Golding-Bird remarks: \* "Of course, the anatomical danger of cutting one, or if carelessly done, both ejaculatory ducts by the lateral method is recognised; but is it proved, if even the accident occur, that any permanent lesion, anatomical or physiological, results. The writer has Mr. Cock's authority for stating that in all his experience of lithotomy (over 200 cases) he has never known injury in this direction

\* *British Medical Journal*, March 5, 1887.

result ; and he has in his recollection a remark of Sir Astley Cooper to the same effect, 'one case only excepted.' That was one of a very large stone, in which Sir Astley had to use the knife freely, and, some time after his recovery, the patient remarked that he had suffered some injury, inasmuch as he 'felt something pass backwards into the bladder' during a certain physiological act. Mr. Cock can add but one case only in which the seminal ducts were injured (or one of them) by operation, and this was after the puncture *per rectum* for retention of urine. Some time afterwards the testis on one side was observed to dwindle, and it finally became completely atrophied, this being attributed to division and subsequent closure of its excretory duct. Even were the duct injured in the course of lithotomy, the known difficulty of occluding by adhesion a mucous tract, however small, renders it very unlikely that the exit of the semen into the urethra would be injured ; most probably its path would be only somewhat short-circuited. Injury of the duct, with occlusion during cicatrisation would be certainly followed by gland-atrophy, and this is not a sequence of lateral lithotomy."

## THIRTY-EIGHTH LECTURE.

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### A MEDIAN LITHOTOMY—STONE IN FEMALES.

THE recent movement to revive the supra-pubic operation for stone in the bladder under somewhat altered circumstances, has been doubtless prompted with the view of diminishing the mortality connected with the removal of those stones from the bladder which cannot be effected by crushing, and of substituting an operation which is free from the difficulties and risks which, either rightly or wrongly, have been associated with lateral lithotomy.

That there are grounds for proposing an alternative is evident from a study of some statistics and records of the latter operation. That the lateral method for stone in adults has been found to be a proceeding attended with a considerable degree of fatality, reaching in some instances it is stated to a death-rate of 35 per cent., there can be no doubt. Further, records of this operation show that this mortality has arisen very largely out of complications having an evident relation to the difficulties with which the operation was performed. For instance, a well executed lateral operation, where everything is straightforward, is about the safest operation of any magnitude in surgery; and in proportion with the degree of deviation from this standard that circumstances render inevitable, may its fatality be measured. In proof of this, let me mention the chief early causes of death after lithotomy. Hæmorrhage, primary and secondary; cellulitis and peritonitis, arising from damage done by the course taken by the knife, as when the latter is allowed to miss or leave the staff and to pass behind or through the

bladder, not mentioning the rectum; rupture of the urethra and failure to enter the bladder; and, lastly, sepsis. With the exception of the last mentioned cause, which is largely determined by the nature of the incisions made, probably all the others are avoidable and need seldom occur, save in connection with an operation the doing of which might be improved upon. Apart, however, from these difficulties and contingencies, there is a necessity for very carefully considering our various means of removing stones from the bladder, by the frequency with which recurrences take place after lithotripsy, even when this operation has been practised by experienced hands; such recurrences have been recently stated as amounting to about thirteen per cent. When we consider the rarity of stone relapses after lithotomy as compared with lithotripsy, we have the best reason for critically studying the former operation with the view of rendering it simple and efficient.

I think it will be generally admitted that the easiest and safest method of entering the bladder, say, for the purpose of exploring it with the finger, is that known as median perineal urethrotomy, or incorrectly, as median cystotomy. By this plan the finger may be readily passed into the bladder without risk. As I have practised this operation for the relief of cystitis, for the exploration of tumours of the bladder and prostate, for prostatomy and prostatectomy, a very considerable number of times, I think my experience has been sufficient to warrant this statement. But, though the finger may thus be readily introduced into the bladder, as well as sounds and forceps for further exploration, it will be urged that nothing of any size can be withdrawn with safety through such a limited opening. Even admitting the fullest amount of dilatation, a uric acid stone of half an ounce in weight could not be withdrawn without such an amount of dragging and tearing as to render a fatal result inevitable. But this exploratory opening, which is essentially the old median cystotomy, can be easily and safely adapted for the removal of larger stones, say, up to six ounce uric acid or

oxalate calculi. The elucidation of this point may be regarded as the first object of this lecture.

During the course of a number of operations undertaken for the relief of symptoms arising from an enlarged prostate, I found it was quite feasible to obtain as free an opening into the bladder by a median incision along the urethra and floor of the prostate as by the ordinary lateral operation for stone. To effect this the following additions to the operation, known as median perineal urethrotomy (page 135), for the exploration of the bladder, are necessary. The finger having thus been passed into the bladder by the side of the staff, the opening is extended in the following manner. In the first place, the membranous urethra is slit up along its floor by a curved probe-pointed bistoury, carried in by the perineal wound along the staff; in this incision may be included more or less of the perinæum, according to circumstances. It is rather astonishing how much more room for getting into the bladder is in this way afforded. Any bleeding vessel may be tied before proceeding further. The deep incision is then made by passing the curved probe-pointed bistoury by the side of the index finger well into the bladder. The staff may now be removed. The blade of the knife is turned towards the rectum, and the floor of the prostate divided from within outwards, commencing at the depression which exists, more or less, in all male adults just within the orifice of the urethra. The incision thus made with the knife may be deepened down to the capsule merely by the firm pressure of the index finger downwards. In this way I have been able to make as free an opening into the bladder, nearly along the median line of the body, as a lateral lithotomy will permit of. This can be readily tested upon the dead subject. Many operators I believe will find this an easier way of opening the bladder freely for the purpose of removing stones which, without the modifications mentioned, could only be effected either by lateral or supra-pubic cystotomy. It may be urged that the downward incision of the prostate necessarily endangers the integrity of

the seminal openings. I am not aware, as I have stated before in connection with this point (page 473), that there is any reliable evidence in favour of such an objection, at least so far as causing a permanent damage is concerned. At all events, I should have no hesitation in saying that if an operator for stone feels that he can perform a median operation with the adaptations suggested, more safely than a lateral, he had better risk the seminal apparatus than the life of his patient.

The operation described, though planned for and practised on adults, is capable of extension to male children should the ordinary median lithotomy not suffice for the size of the stone, as the floor of the urethra and rudimentary prostate may be divided in a downward direction with a bistoury. I have sometimes heard it stated that the lateral operation in very young male children is not only difficult but dangerous, by reason of the risk there is of rupturing the urethra in endeavouring to enter the staff and dilate the canal, and then pushing on everything, including the bladder, before the tip of the finger. In this way there can be no doubt that the bladder has not been entered at all, and the way to it irretrievably lost. In connection with this point, I would remark that such a risk is usually incurred by a misconception as to the mechanism of lateral lithotomy. When the groove in the staff has been exposed by the first incision, no attempt should be made to force the finger into the bladder until the point of the knife has been run along the groove towards the bladder for such a distance as to allow the finger of the left hand to be *put* into the bladder, and not pushed. The way into the bladder should be cut with the knife, and not bored with the finger. Where due regard is given to this point it is quite impossible, even in a child of the tenderest age, either to rupture the urethra or to push the parts in front of the index finger. So much stress has been laid upon dilatation by some authors, as a necessary part of lithotomy, that I have taken this opportunity of referring to it as an error that is sure sooner or later to be the cause of embarrassment to those who

✱

place any reliance upon it. There being no necessity for the introduction of the finger into the urethra as a preliminary to the passage of the knife through the tissues constituting the neck of the bladder, renders the lateral operation peculiarly adapted for young male children, where the parts are small and might be readily torn by the injudicious use of the index finger in endeavouring to make a way into the bladder.

Further, the deep incision I advocate in connection with this method of performing median lithotomy assimilates it with the lateral proceeding, not only in providing freedom of access to, and exit from, the bladder, but in being followed by an incontinent flow of urine which continues for some days. An ordinary median perineal urethrotomy will not drain effectually without a drainage tube. This it is often desirable to dispense with, especially in chronically inflamed and ill-shaped bladders, where the urine is offensive. This is an important safeguard against sepsis. However perfect the median operation for stone might be so far as the withdrawal of the stone is concerned, I should set it aside unless it provided for incontinent urine drainage, which may be depended upon to last for at least some days. The vertical division of the prostate muscle was advocated by Vacca Berlinghieri\* at the commencement of this century, but chiefly in connection with a recto-vesical operation, which has now become obsolete. A reference to Vacca's plates shews that he made his incision through the floor of the prostate, a little to one side of the median line, with the view of avoiding the seminal openings. In the course of a number of operations on the obstructing prostate† I soon became convinced that it was almost impossible to make a safe and satisfactory division of the prostate, whether normal or enlarged, from a median urethrotomy, except in a direction from within outwards, as I have now described; and, further, that the full effect of such a section could not be wholly appreciated as a means of free access

\* *Della Litotomia*, Pisa, 1825.

† *Trans. International Med. Congress*, Copenhagen, 1884.

into the bladder, unless it was accompanied with the division along its floor of the membranous urethra, as the latter structure, in conjunction with the bulbous portion of the canal, seemed in a great measure, as it were, to arch in the outlet from the bladder, and to restrict manipulations within the interior of this viscus. The chief advantages of the median method I have described may be briefly summarised as :—

1st. That an incision is made into the bladder along the median axis of the outlet from the pelvis, which gives as much room, if not more, for manipulation as the lateral incision.

2nd. That with such an incision the liability to hæmorrhage is less, whilst the facility for getting at any bleeding point is increased.

3rd. That the movements of the knife in one hand are, from the beginning to the end of the operation, under the direction and control of the index finger of the opposite hand.

4th. That it entirely removes the dragging and tearing of the old median operation should the stone prove a large one, and therefore it adapts the median procedure to a wider range of stone as well as of tumour cases.

5th. That like after lateral lithotomy a similar state of temporary incontinence of urine is provided for, and thorough drainage secured, should this be desirable.

We have been too much accustomed to draw our ideas relative to the section of the prostate in lithotomy from the contracted appearance presented by the part after death. As a matter of fact, unless the bladder is absolutely empty, the prostate is disposed as a muscular ring, spread out like a circular cone, with its apex directed forwards. The contracted prostate from which our notions, as well as many of our plates, are drawn, rarely presents itself to the lithotomist. In connection with the making of the deep incision through the prostate in a direction from within outwards on a guide, it would appear from the surgical lectures of Dr. Alexander Monro, of Edinburgh, that Frère Côme, a successful lithotomist of the last century,

was in the habit of incising in this way, thus avoiding many of the dangers which befell his contemporaries. I will now illustrate some of these points by the following case, where the recovery of the patient, notwithstanding his feebleness and complications, has been remarkably rapid and uneventful.

C. B., stated to be fifty-six years of age, but looks about seventy, was admitted into the Royal Infirmary on March 9, 1887, having been sent to me by Dr. M. J. Campbell. He had previously been in hospital for what was stated to be an impassable stricture. He presented the appearance, mentally and physically, of a feeble old man. I found him suffering from a very narrow long stricture in front of the bulb, a false passage of some length and far more easily entered than the natural canal, a stone in the urethra behind the stricture, a large prostate, one or more stones in the bladder, and chronic cystitis. He passed his urine in drops incontinently, and his clothing and bedding were more or less constantly soaked with ammoniacal urine. Having regard to his general feeble condition, as well as the varied nature of his local symptoms, it was difficult to determine what was best to be done, especially having in view the probability of his ureters and kidneys being also in some degree involved. A free median incision into the bladder, as I have described, seemed to offer the best solution, with the least risk. Further, should the condition of the strictured urethra prove such as to render a permanent median perineal opening desirable, this would be provided for by the median operation. On March 29th, 1887, Dr. Paul Rodet, of Vittel, and Dr. Wilson, of Boston, U.S.A., being present, the patient was placed under ether, and the stricture divulsed so as to allow a moderate sized grooved staff to be passed into the bladder. He was then placed in the lithotomy position, when I did a median perineal urethrotomy, and extracted a uric acid calculus which was wedged in behind the stricture. I then divided the floor of the membranous urethra, including a considerable mass of cicatricial tissue which constituted the stricture. Passing my finger into the bladder, I then divided the somewhat large prostate directly backwards with a curved probe-pointed bistoury from within outwards, completing my incision to the utmost limits of the prostatic capsule by the pressure of my index finger. In this way I had made an opening into the bladder in the median line which would readily admit my first three fingers. Forceps were then introduced into the bladder, and I extracted two moderate

sized calculi, one uric acid, and the other phosphatic; in addition, a considerable quantity of soft putty-like phosphatic incrustation was also removed. No vessels were tied, and the patient certainly did not lose an ounce of blood. I am sure I could have removed by this opening with ordinary lithotomy forceps a hard stone of at least six ounces in weight. As a precaution against any bleeding, a large double drainage tube was introduced, and the wound above and below it closed with sutures so as to make the tube fit with some tightness. The patient was then removed to bed, the whole of the proceedings only occupying a few minutes. The patient's convalescence was uninterrupted. He was up on April 10th, went out for exercise on the 14th, and was discharged well on May 5th. His urethra, commencing in the penile portion down to the anterior limit of the incision, was so damaged by an old standing stricture that, though a whip bougie could be passed throughout the whole length of the canal, I advised him to retain as a permanency his perineal opening. This proved an excellent solution of the difficulties which were inseparably connected with his complications, age, and feebleness.

Apart, however, from the latter consideration, the case is referred to in illustration of my previous remarks. It was the only way of meeting a most unfavourable series of complications without exposing the patient to far more serious risks. It must not be understood that I have any reason to be dissatisfied with lateral lithotomy. On the contrary, I prefer it to any other cutting operation, not only for the ease and speed with which it can generally be accomplished, but what is of still more importance, for its safety in appropriate cases. On the other hand, understanding why lateral lithotomy can never be universally acceptable, I think it is desirable that we should place on record what seem to be efficient alternatives. Though I have had no opportunity of testing it, I believe this proceeding might in some instances be practised as a preliminary to the catheterization of the male ureters.

Stone in females, both in adults and children, is a comparatively rare affection, a circumstance which is probably due to the urethra favouring the escape of a calculus at the earliest period

of its formation. Calculous concretions on foreign bodies, such as hair-pins, are not unfrequently met with, and the possibility of a stony mass having a nucleus of this kind must not be lost sight of in connection with their removal. Several instances are recorded where the jaws of the lithotrite became entangled in wires and hair-pins, upon which a phosphatic deposit had taken place, during attempts made to remove the foreign body in this manner.

In adult females, where the stone is not large, removal may be undertaken by rapid dilation of the urethra and extraction of the calculus with forceps. If dilatation is excessive more or less permanent incontinence of urine may result, a circumstance which is most distressing to the patient as it is not easily remedied. As indicating the extent to which the female urethra may with safety be dilated for the purpose either of exploration or of extracting a stone, the following passage from a recent author may be quoted:—"Simon, of Heidelberg, has made dilatation of the female urethra a proceeding applicable with scientific accuracy. The urethra can be dilated to a diameter of 1·9 to 2 centimetres, or  $\frac{3}{4}$  inch, in women over twenty years of age; to 1·8 centimetres, or rather more than  $\frac{1}{2}$  inch, in those between fifteen and twenty; and to 1·5 centimetres, or  $\frac{5}{8}$  inch, in those between five and eleven. Under twenty years of age these measurements may, in case of need, be exceeded by 2 or 3 millimetres. In no case does incontinence of urine result. Simon's statements have now been verified by general experience. Hence, since the average diameter of a man's right index finger at its thickest part is about  $\frac{3}{4}$  inch (1·8 cm.), and of his little finger  $\frac{5}{8}$  inch (1·5 cm.), it may be stated that we can safely dilate the adult urethra so as to admit the index finger, and the child's so as to admit the little finger."\*

In the case of very large stones, which cannot be included

\* "On the Operation for Stone in the Female Bladder," by A. Ogston, M.D.  
—*Edin. Med. Journal*, July, 1879.

within the grip of the lithotrite, removal has been effected by supra-pubic or vaginal lithotomy. The latter operation consists in opening the vaginal wall of the bladder by a median incision, and, after extracting the stone by forceps, reuniting the edges of the wound by sutures, as is done for vesico-vaginal fistula. In an interesting paper by Dr. Warren,\* this operation is fully discussed and illustrated. Dr. Aveling,† and Mr. C. Williams,‡ of Norwich, have also described this method of operating. The worst danger likely to follow it is incontinence from failure of the wound to unite, a remediable condition, and therefore very different from the incontinence that follows over-distention of, or incision into, the female urethra. Dr. Galabin has recently recorded a case where by this operation he removed twelve large calculi and about fifty small ones from the bladder of a woman aged sixty-one. The wound was closed by silkworm gut sutures, and at the end of ten days union was complete. §

I determined some time ago to attempt to remove all stones from female children without practising any more dilatation of the urethra than was sufficient to introduce the lithotrite I usually employed for this purpose; it is of the calibre of a No. 12 English catheter. Since I have adopted this plan I have not met with the slightest incontinence afterwards, and the operation has consequently been reduced to one of the simplest of its kind. In the following case, by reason of the size and hardness of the stone, the operation was submitted to what I think will be regarded as a fair test.

M. A. M., aged nine years, was admitted into the Royal Infirmary, June 3, 1885. The patient was evidently of a delicate nature, and had suffered from some symptoms referable to the bladder for many months; recently she had experienced most extreme pain during the act of micturition, and could only pass water when in the erect posi-

\* "On Vaginal Lithotomy," by J. C. Warren, M.D.—*Boston Medical and Surgical Journal*, July 20, 1876.

† *Obstetrical Society's Trans.*, 1863.

‡ *The Lancet*, Nov. 7, 1885.

§ *Obstetrical Society's Trans.*, April 7, 1880.

tion. On examination a large stone was detected in the bladder. On June 10th, I performed lithotrity under chloroform. The stone was one inch and a half long and nearly as broad; it almost completely filled up the jaws of the lithotrite. On crushing it, a coating of phosphates was broken off, disclosing a large mulberry nucleus—so hard was it that I strained and rendered useless a lithotrite which I have now used constantly for some years. I had to employ the toothed instrument and considerable force before the stone was completely triturated. I succeeded in removing all the fragments, partly with the aspirator and wash-bottle, and partly with ordinary dressing forceps. Though dealing with so large and hard a stone, I may say that the water as it entered the wash-bottle during the whole time the operation lasted (nearly twenty minutes) was not discoloured with blood. I mention this as it is most important in all cases of lithotrity to conduct the manipulations with as little damage to the walls of the bladder as possible. Six days after the operation the patient was well and left the hospital; as soon as the stone was removed from the bladder all trace of her disorder at once disappeared. The stone fragments, oxalates and phosphates, weighed nearly half an ounce.

I have selected this case as illustrating what lithotrity is capable of doing under these circumstances, and how effectually it may be employed for the purpose of removing the stone without leaving behind the slightest trace of any damage having been inflicted upon the parts. In the present day we are not likely to meet with many cases where female children develop stones in their bladders exceeding the size here recorded, and consequently lithotrity, without dilatation, will be found generally applicable to them.

The female urethra is occasionally made the resting-place for a stone. Some years ago I assisted Dr. Lyster to remove a uric acid calculus lodged in a sulcus in the floor of the canal. The stone was of an oval shape, and measured one inch and a half in length and three-fourths in breadth. Removal was effected by rapidly dilating the urethra with Weiss' instrument, and extracting with forceps. The patient recovered without a bad symptom.

Phosphatic concretion on the walls of the bladder is met with both in males and females. A well-marked instance of this I recently saw, where the mucous membrane of the bladder in a female was deeply encrusted with this deposit. It was necessary to dilate the urethra, and then with the finger to peel off, as far as possible, the concretion. This was followed up by injections of a weak solution of nitric acid, under which treatment the patient progressed satisfactorily.

## THIRTY-NINTH LECTURE.

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### LITHOTRITY OR LITHOLAPAXY IN ADULTS AND CHILDREN.

THE treatment of stone in the bladder by lithotrity, or crushing, will now have our consideration. Fortunately, I can say, thanks to recent improvements, which will be presently noticed, this proceeding will be found to cover the great majority of cases met with in adults; how far it is applicable to children, and under what circumstances, will be discussed later on.

In teaching students and junior practitioners, I have often been asked, how is this operation to be learnt, and how are we to acquire a knowledge of the various manipulations necessary to make us successful lithotritists? By far the greater number of operative procedures can be learnt absolutely on the dead subject, whilst others have the advantage of our being able to see everything that is done. This does not apply to lithotrity. We can learn nothing about it of use in practice from the cadaver, and in the living the whole process is conducted, as it were, in the dark. To learn lithotrity you must first prove yourself to be more than usually adept with the catheter and all manner of instruments used in the examination of the urethra and bladder. Let me see a man select and use a catheter, and I will soon tell him whether it is worth his while to attempt to practice lithotrity or not. How can a practitioner hope to acquire the touch of the lithotritist if he cannot learn to manipulate a strictured urethra with delicacy? In these directions then you may pave the way towards attaining the special art—for art it is—to which I am now referring. I speak about

this point simply because asked, and I reply from what I have observed.

Before dealing with the details of lithotrity, I will briefly allude to a change which may be regarded as an epoch in the history of this operation. Up to within a few years ago, Civiale's method of operating had been practised in this country and elsewhere with a considerable amount of success. The proceeding consisted in the breaking up of the calculus by the lithotrite, at one or more sittings, according to circumstances, the fragments being either partially removed by appliances such as Clover's instrument, or allowed to escape spontaneously with the urine. Each sitting, or rather breaking of the calculus, was limited to a few minutes, there being an agreement that anything like a prolonged use of the lithotrite was hazardous. This practice was attended, with few exceptions—where the stones were so small or so friable as to be crushed with one or two grips of the lithotrite—with the retention in the bladder, for varying periods, of pieces of rough and broken stone, which had no means of escape other than those mentioned. Here, then, was a fruitful cause of cystitis, which necessarily became a serious complication.

I will now proceed to notice what may be called the second epoch, as distinguished from Civiale's, in the history of the crushing operation for stone. Shortly after an article by Professor Bigelow, of Boston, "On lithotrity by a single operation."\* appeared, I was present at the Massachusetts General Hospital, and saw Dr. Bigelow remove a large uric acid stone from the bladder of a man, by a proceeding which, to my mind, was different from anything I had previously seen or read of. The chief points of distinction seemed to be (1), the recognition as a principle of the possibility and propriety of the removal of the entire stone, without reference to its size, from the bladder at one operation; and (2), the employment of an evacuating apparatus adequate to the purpose in view. These principles

\* *American Quarterly Journal of the Medical Sciences*, Jan., 1878.

were demonstrated to me in the case to which I have referred. In one hour and nineteen minutes, under ether, a large uric acid calculus was reduced to fragments, and entirely removed from the bladder. On the fourth day the patient was convalescent. At that date I understood this operation had been practised fourteen times—including a case each by Dr. J. C. Warren and the late Dr. Curtis, of Boston—with one death. I was much indebted to Dr. Bigelow, not only for the full explanation he gave me of his method of operating, but also for permitting me to take part in the various manipulations. In the same year, I reported to the surgical section of the British Medical Association, at Bath,\* what I had seen, and exhibited, I believe for the first time in England, Dr. Bigelow's apparatus. Very shortly afterwards I performed the new operation, and have continued to do so since.

The anticipations then expressed in reference to this operation were not unanimously favourable to it. The following passage from a leading medical journal contrasted strangely with the position the operation was about to take:—"We do not think that Dr. Bigelow's line of practice will meet with any followers in this country, and it is to be regretted that he has lent his name to a proceeding that is likely to bring discredit upon the operation of lithotrity—an operation which still has so many open opponents, that it more than ever requires to be saved from its friends."† It seems unaccountable that a writer, who was probably selected as being practically conversant with this department of surgery, in thus giving expression to the doubts evidently entertained by so many as to the value of lithotrity as then performed, should, at the same time, have entirely misjudged the position of the proceeding which was soon destined to supplant it, and to be generally recognised by surgeons as an improvement.

\* *British Medical Journal*, 1878, vol. ii.

† *British Medical Journal*, August 3rd, 1878. Review of Dr. Bigelow's Work on Litholapaxy.

Without further reference to the manner in which Dr. Bigelow's proposals were received, I will proceed to notice some of its details. As before stated, its object is to remove the stone at a single operation. To effect this painlessly, the patient is kept under an anæsthetic during the whole of the proceeding. In the removal of some large stones the time occupied has been considerable. In a case reported by Professor Cheever,\* of Boston, the operation lasted three hours under ether; the stone was exceedingly hard, being composed of oxalate of lime. The patient made an uninterrupted recovery, and was kept in bed two weeks, much against his will. In a case where I removed a stone weighing over two ounces, the operation lasted two hours and ten minutes. Dr. Keegan† reports a case where the operation lasted over four hours, the patient being well enough to return home six days afterwards. Reference is made to cases such as these to show that there need be no time limit, so long as the manipulations are carefully conducted.

The operation necessarily resolves itself into two parts—namely, the breaking of the stone into fragments, and the removal of the latter from the bladder. For crushing, I have not yet found any instrument superior to the smooth and fenestrated lithotrites commonly used in this country. I generally employ the former, whilst the fenestrated, or more powerful instrument, has been reserved for a few calculi, which, after being reduced by it, were then dealt with by the other. Stones which, by reason of their nature or size, cannot be crushed with either of these instruments, are, I believe, more safely treated by lithotomy. The power and strength of these lithotrites are well illustrated by a case recorded by Mr. James Adams:—

A circular oxalate of lime calculus, more than an inch in diameter, was successfully crushed at one sitting, lasting an hour, and yielded five drachms of fragments. The fragments, after the first crushing,

\* *Boston Medical and Surgical Journal*, March 23rd, 1882.

† *The Lancet*, vol. ii, 1886.

being found so extremely hard, the lithotrite was withdrawn, and a piece of steel placed within its jaws, and upon this the operator screwed up the instrument with all his force, and found it strong enough to withstand all that could be brought to bear upon it.\*

The only objection raised to their use is, that they are apt to become impacted, and thus retard the progress of the operation. I have never suffered much inconvenience from this; probably because of the frequency with which I make use of the aspirator, with the object of keeping the bladder clear of all fragments capable of being withdrawn.

It is seldom that the impaction of a portion of a calculus in the blades of a lithotrite can be of such a nature as to render the closure of the blades physically impossible. Mr. Cadge has been good enough to inform me that such an occurrence recently happened in his practice. In using a lithotrite for the purpose of measuring a stone in a male child, with the view of ascertaining whether it could be crushed, on seizing the calculus and lightly closing the blades upon it, he found to his astonishment that the instrument, though one of the best of its kind, had become absolutely locked. He could neither close the instrument or open it further; it was, in fact, jammed, and no force that he could safely apply to it was of any avail. Under these circumstances, Mr. Cadge performed a supra-pubic cystotomy on the end of the lithotrite; and, by protruding it, he was able, by means of his finger, to clear the jaws of the instrument from the debris that had become impacted in a most unusual manner. The patient made a good recovery. I am indebted to Mr. Cadge for giving me the opportunity of referring to this point.

It is not until after the first crushing and aspiration that I inject water, with the view of retaining it during the remainder of the operation. I then keep the bladder tolerably distended. In determining the precise amount of water to be retained

\* *British Medical Journal*, September 16th, 1882.

within the bladder during the operation, I have regard to two objects; (1), to reduce to a minimum the risk of any injury being done to the walls of the bladder by the instruments employed; and (2), to provide space for the movement of the fragments as they are broken by the lithotrite and withdrawn by the aspirator. A little experience enables the surgeon to regulate this.

The second part of Bigelow's proceeding is the removal of the fragments. This is effected with urethral tubes (Fig. 90)—considerably larger than anything previously used for the purpose—and a suction apparatus, by which the fragments are withdrawn.

When the bladder is filled with water, and connected with the aspirator bottle by means of the evacuating tube, we have practically two reservoirs brought into communication in such a manner as to permit of an interchange of their respective con-

tents, as shown in the figures. (Figs. 91 and 92.) This interchange is brought about by gently squeezing the aspirator with the hand. As the fragments of stone enter the aspirator, they fall into a glass receptacle at the bottom of it, in which they are detained. When it is found that some of the fragments are still too large to pass through the evacuating or urethral tube, the lithotrite is again brought into use. The number of crushings and washings required depends on the size and hardness of the stone, and in some measure on the dexterity of the operator.

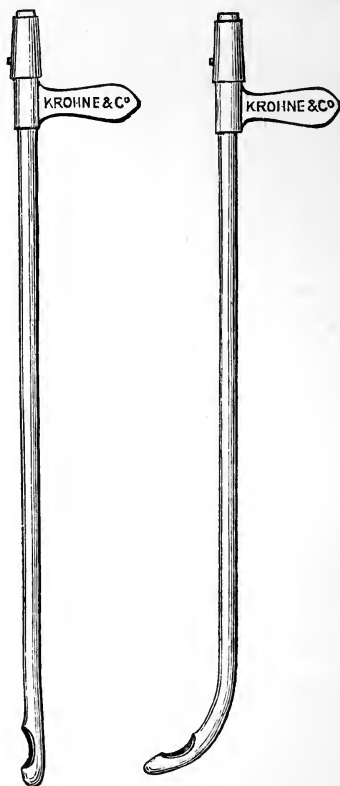


Fig. 90.

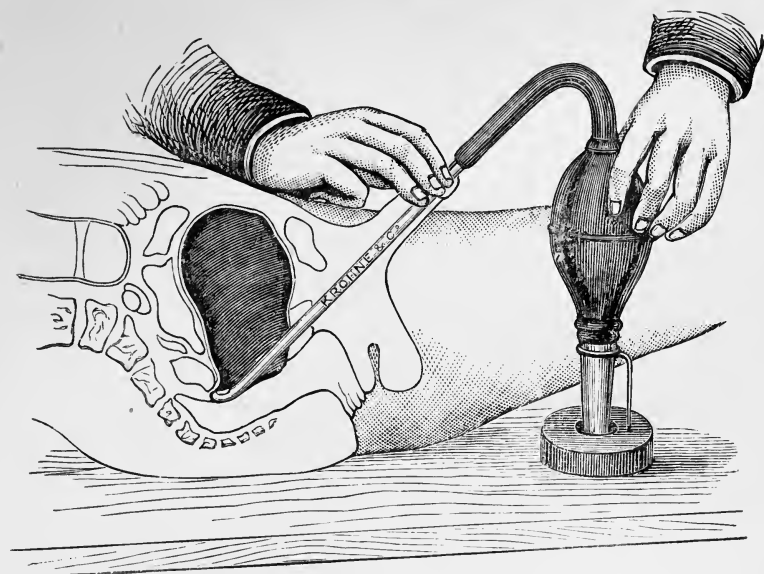


Fig. 91.

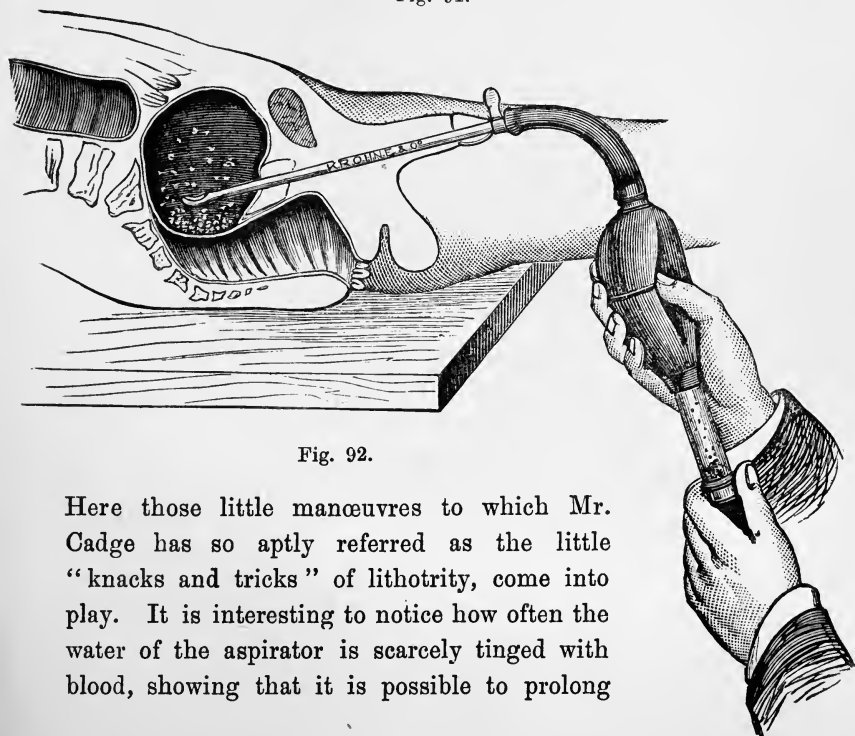


Fig. 92.

Here those little manœuvres to which Mr. Cadge has so aptly referred as the little “knacks and tricks” of lithotrity, come into play. It is interesting to notice how often the water of the aspirator is scarcely tinged with blood, showing that it is possible to prolong

these manipulations without inflicting damage on the walls of the bladder.

After trying various modifications of the aspirator or wash-bottle, I must express my satisfaction, so far, with the original instrument as represented in Figs. 91 and 92. Exception has been taken to it on the grounds (1), that the trapping of the fragments is imperfect; and (2), that the apparatus permits air to enter the bladder. Admitting the truth of these objections to some extent, I am not disposed to think that the utility of the instrument is thereby seriously impaired.

I have been frequently using a simple form of aspirator, described by Mr. J. H. Morgan,\* where the position of the trap is altered. So far it has proved in my hands both convenient and free from needless complications (Fig. 93). I generally have two in use at a time, one I am working with whilst the other is being filled out of a bucket of water.

Dr. F. N. Otis† has described an evacuator (Fig. 94)‡ which does its work very satisfactorily. By an ingenious arrangement of the discharge-pipes within the glass receiver the return of a fragment of stone into the bladder, which has once become trapped, is rendered well-nigh impossible.

I have not found a small quantity of air obstruct the necessary manipulations, for the reason, I suppose, that the air and the stone fragments tend to occupy opposite quarters in the bladder, and that where the one is, the other is not to be found. If enough air enter the bladder to interfere with the withdrawal of the fragments, or to provoke spasm, it is easily displaced by disconnecting the evacuating tube from the aspirator, and making pressure with the hand over the pubes.

In reference to the presence of air in the bladder, the

\* *The Lancet*, September 2nd, 1882.

† *New York Medical Herald*, Nov. 3, 1883.

‡ Since this drawing was made Messrs. Krohne & Sesemann have improved the instrument by placing the catheter at an angle with the apparatus, by which its use is rendered easier.

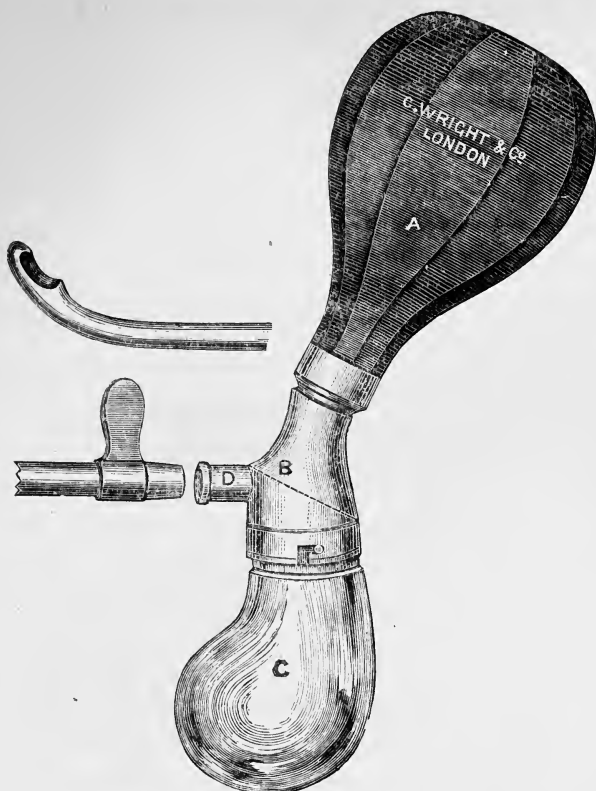


Fig. 93.

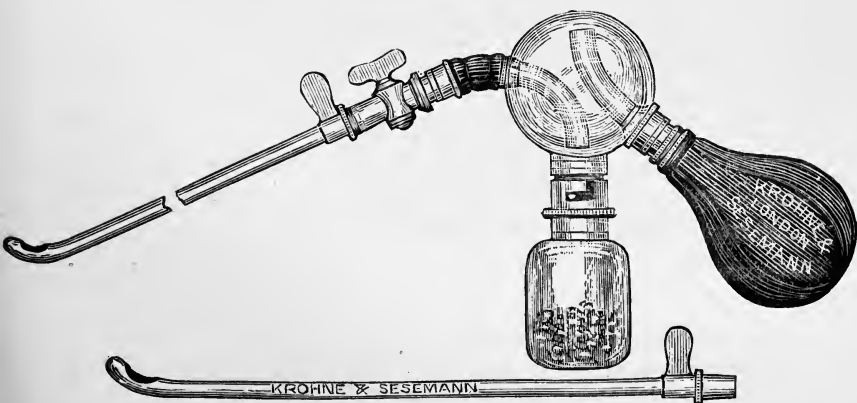


Fig. 94.

following incident may be worthy of record, as it is a personal experience bearing upon this point :—

When I was in Philadelphia, in 1881, Dr. Brinton called my attention to a case where a patient had made for himself an apparatus for washing out his bladder, which he demonstrated to us on his own person. The apparatus—a most efficient one—was constructed of a catheter with a large eye, the glass shade of a paraffin lamp, and the rubber of a breast pump. I remember the patient insisting that, by first introducing some air into his bladder, the process of washing out was much facilitated and rendered painless. I was struck at the time with this observation, and watched with interest the demonstration of it. The patient was under the impression that he was suffering from stone, but none could be found.

In manipulating the aspirator, I do not use the stand, as seen in Fig. 91, even in prolonged operations, as I have noticed that the fragments are withdrawn in greater numbers by making slight alterations—elevations, depressions, and rotations—in the position of the evacuating tube. In selecting evacuating tubes, the object should be to use the largest the urethra will receive, provided it can be moved about easily. In some persons the meatus is so contracted that it is necessary to incise it before a sufficiently large tube will pass. Referring to the size of the evacuating catheters, Dr. Bigelow remarks :—“31 is very rarely needed, and the French sizes, 28 and 29, are generally the most convenient. For a final washing or sounding without anæsthesia, when it is desirable to give the patient the least discomfort, even so small a calibre as 26 is sometimes useful.”\* A too tightly fitting catheter may damage the deeper portion of the urethra, which is less tolerant of injury than the bladder.

I generally use first a curved evacuating tube (Fig. 90). If the fragments do not escape freely through it after I consider that they have been sufficiently broken up, at the next washing I substitute a straight one (Fig. 90), which can be quite as

\* *The Lancet*, January 6th, 1883.

easily passed by giving it, as Bigelow observes, "a rotation," as it temporarily hitches at the opening through the triangular ligament. In removing fragments, as well as in crushing them, there can be no doubt that the position of the patient is of much importance. Raising or lowering the pelvis often exerts a marked effect. Reliquet\* advocates the employment of a special apparatus for this purpose, which I have seen Gouley, of New York, use with advantage. I have, so far, been able to secure desirable positions with pillows, but probably they are not so easily managed as the contrivance referred to, which is here figured. (Fig. 95.)

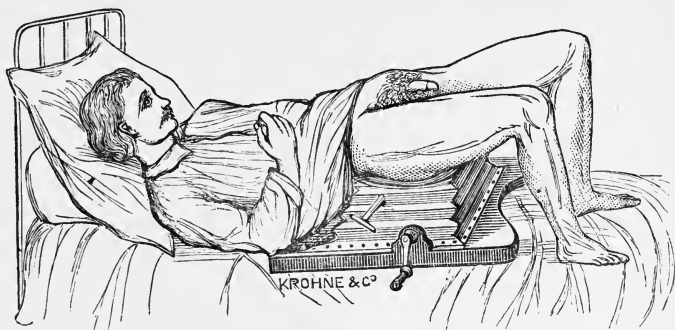


Fig. 95.

When using either the lithotrite or the aspirator, the bladder, even when the patient is deeply etherized, sometimes exercises a violent expulsive effort. Until this is over, all manipulations should be suspended, otherwise an accident might possibly happen. "Even deep anæsthesia," as Billroth observes, "is not always sufficient to obviate spasmodic action of the bladder."† When manipulating with a considerable quantity of water in the bladder, if spasm comes on, I at once take off all tension by allowing an escape to take place—a sort of safety-valve action. I think this is a wise precaution.

These are the chief points in connection with the perform-

\* *De la Lithotritie rapide*, Paris, 1882.

† *Clinical Surgery*, Sydenham Society, 1881, p. 273.

ance of this operation, it practically consists of triturating the fragments with the lithotrite, and then removing them with the aspirator. These manipulations may be practised an indefinite number of times, until the bladder has been cleared of its last fragment. The best test for the last fragment is the suction power of the aspirator bottle, as it is sure to be felt knocking against the eye of the catheter, claiming, as it were, the permission of the operator to escape, but in a reduced form. I always make a point at the conclusion of an operation of this kind of washing out the bladder with warm, or rather hot water, until it returns almost free from being discoloured with blood. In the case of small stones this should not be necessary, as no hæmorrhage need be occasioned; in large stones, where the manipulations are prolonged, it is almost impossible to avoid causing some slight bleeding, but no blood should ever be left to accumulate in the bladder. After lithotrity care must be taken that the urine is not allowed to be retained beyond a reasonable time; if there is the least doubt as to whether the patient completely empties his bladder or not, a soft catheter must be passed, and if the urine shows any sign of decomposition, or of offensiveness, a few ounces of very weak tepid carbolic lotion may be thrown in, and ejected by the catheter, until all odour is removed. If attention is not paid to these points, not only may cystitis arise, but, worse than this, some form of phlebitis may be set up. If in doubt after a lithotrity upon these points, use a catheter.

Phlebitis after lithotrity, most commonly involving the veins of the legs and the neighbourhood of the joints, and giving rise to secondary complications in the lungs, is a serious sequel. As I believe it never occurs unless damage is done to the bladder or urethra in the course of the manipulations necessary for breaking and removing the stone, every care should be taken to prevent doing structural damage in the use of the lithotrite, and in the introduction and withdrawal of the aspirator catheters. When any such damage is unavoidably

occasioned, as in very prolonged operations, the best safeguard against the development of such contingencies as are now referred to is the most scrupulous care in keeping the bladder empty, and the urine aseptic by suitable antiseptics. With a clean bladder and normal urine, phlebitis is very unlikely to develop, whatever the local condition may be. It is hardly necessary that anything further as to its treatment should here be said.

Total suppression of urine after lithotrity is also a very serious, and rapidly fatal, complication; for the most part it happens with persons with unsound kidneys where the operation has been of a prolonged character. For the management of this complication reference may be made to my remarks in connection with the subject of urethral or urinary fever.

I think it will be generally conceded that for all calculi of a moderate size,\* occurring in otherwise healthy male adults, lithotrity is the treatment which will give the best results.

\* In the following table I have given the weight of some calculi in the Museum of the Royal Infirmary, and the measurements of their longest and shortest diameters :—

No.	COMPOSITION.	Weight.	Long Diamtr.	Short Diamtr.
15	Uric Acid . . . . .	343 grains	1 $\frac{3}{8}$ in.	0 $\frac{7}{8}$ in.
16	Urates and Phosphates . . . . .	404 "	1 $\frac{3}{4}$ "	1 "
17	Urates and Phosphates . . . . .	317 "	1 $\frac{3}{4}$ "	0 $\frac{3}{4}$ "
23	Uric Acid, Oxalate, and Phosphate . . . . .	370 "	1 $\frac{3}{4}$ "	0 $\frac{1}{10}$ "
27	Uric Acid, Phosphate, and Oxalate . . . . .	403 "	1 $\frac{1}{2}$ "	0 $\frac{1}{10}$ "
30	Oxalate and Phosphate . . . . .	391 "	1 $\frac{1}{2}$ "	1 $\frac{1}{4}$ "
31	Urates, Oxalate, and Phosphate . . . . .	387 "	1 $\frac{3}{8}$ "	1 "
34	Uric Acid and Phosphate . . . . .	402 "	1 $\frac{7}{8}$ "	0 $\frac{1}{10}$ "
36	Oxalate and Uric Acid . . . . .	346 "	1 $\frac{1}{4}$ "	1 $\frac{1}{10}$ "
46	Uric Acid, Oxalate, and Phosphate . . . . .	324 "	1 $\frac{7}{10}$ "	1 "
55	Uric Acid and Oxalate . . . . .	532 "	1 $\frac{7}{8}$ "	0 $\frac{7}{8}$ "
61	Uric Acid . . . . .	347 "	1 $\frac{5}{8}$ "	0 $\frac{1}{10}$ "
62	Urates and Phosphates . . . . .	320 "	1 $\frac{3}{4}$ "	0 $\frac{7}{8}$ "
63	Uric Acid . . . . .	381 "	1 $\frac{3}{4}$ "	1 "
135	Phosphates (perforated) . . . . .	547 "	1 $\frac{7}{8}$ "	1 $\frac{1}{4}$ "
176	Oxalate and Phosphates . . . . .	345 "	2 "	0 $\frac{1}{10}$ "
177	Oxalate and Phosphate . . . . .	324 "	1 $\frac{3}{4}$ "	0 $\frac{1}{10}$ "

Stones within the dimensions represented by an ounce in weight, or thereabouts, are now removed at a single sitting with such safety and certainty as to render the proceeding as successful as any of the greater operations in surgery. Even these limits are exceeded in the experience of surgeons now practically conversant with the details of litholapaxy. If there is one point upon which there seems to be a general agreement, it is that moderate-sized stones in adults, such as would be included in the dimensions I have indicated, are best dealt with by lithotripsy. As Bigelow has observed, "we need no further statistics relating to small stones;" nor can much value be attached, as affecting the selection of the operation, to any more records of cases in which, from the small size of the calculus, or the absence of complications, there could have been no reasonable doubt as to the propriety of crushing.

The direction, I take it, in which information will still be of value is when the confines between lithotomy and lithotripsy are reached—when the question arises whether to crush or to cut is the safer proceeding.\* Where stones are unusually large, or where their presence is complicated with coexisting disease in the urethra, prostate, bladder, or kidneys, it cannot be said that there is a consensus of opinion as to the best method of procedure.

When stone in the bladder is complicated, as it often is in elderly persons, with enlargement of the prostate, unless the hypertrophy is considerable, or of an unusual kind, lithotripsy is not to be regarded as contra-indicated. I have been told that the great success of lithotripsy in India is in a measure due to the infrequency with which the natives suffer from enlargement of the prostate. Whenever there is insuperable difficulty in readily seizing and manipulating the stone with the lithotrite, it will be expedient to substitute lithotomy. Under the same circumstances, an inability to discharge, spontaneously, the

\* "Boundary Stones," as Mr. Teale calls them.—*Trans. International Medical Congress*, 1881, vol. ii.

urine from the bladder may be a reason why it is safer to discard lithotriety. Hæmorrhage, even of the passive kind, which sometimes follows crushing, in a bladder completely atonied, and where there is no escape for the blood but by the urethra, is a serious contingency to provide against. A bladder that is capable of contraction is far less likely to continue to bleed, even after gentle manipulations, than one which is temporarily, if not permanently, paralysed.

The expediency of cutting, rather than crushing, is increased when there are grounds for believing that the formation of a stone in the bladder is secondary to a large prostate. True, in many cases of enlarged prostate, the conditions favouring recurrence of stone after removal may be kept in abeyance by a moderate amount of attention on the part both of the practitioner and the patient. Still, on the other hand, there are cases of this kind where the state of the prostate occasions symptoms which are positively worse than the presence of the stone it has contributed to produce. Under these circumstances, lithotriety must be regarded as a palliative, rather than as a cure.

When stone is complicated with tumour of the bladder, as it sometimes is, lithotomy would, as a rule, be indicated in preference to lithotriety, as the former proceeding permits of the tumour being explored, and removed if found practicable on direct examination with the finger. In a case of this kind, reported by Dr. Alexander,\* where he performed supra-pubic lithotomy, and removed a stone from a cancerous bladder, we have an illustration of what, perhaps, is best to be done under these circumstances.

As in other disorders, where operative treatment has to be considered, structural kidney disease is alike unfavourable for lithotomy and for lithotriety. It is, however, a question of degree, which often requires very fine balancing, and where some previous knowledge of the patient and his constitution is of

\* *Liverpool Med. Chir. Journal*, July, 1884.

material assistance. Whether to remove the stone by lithotrity or lithotomy, or not to remove it at all, contenting ourselves with making our patient's remaining days as comfortable as the resources of medicine and surgery will permit, are questions involving the gravest responsibility: so much depends on the mental and physical temperament of the patient; so little can we rely on rules having general rather than individual application.

My own experience leads me to believe that lithotrity usually produces far less shock than lithotomy. The dread of undergoing an operation in which the knife is employed, though the pain may not be felt, is with most persons quite sufficient to turn the scale in favour of one in which the object can be attained without cutting. Considerations such as these, as well as others, must be entertained and carefully weighed.

Then, again, as I have just intimated, there are—very rarely, I believe—cases so complicated with other diseases that operative proceedings seem to be unjustifiable, if we may apply such a term to efforts, however misjudged, intended to prolong life. More than one case has come under my notice where I have advised, with regard primarily to the state of the kidneys or other vital organ, that the removal of the stone should not be attempted, and have had the satisfaction of believing, if not of positively knowing, that the acceptance of my advice has been the means of permitting a person to live out his days with not more discomfort than surgery could completely alleviate. To a surgeon there is probably no position more trying or involving weightier responsibility, than that of declining or dissuading from an operation which, under other conditions, might be reasonably expected either to prolong life or to make it endurable.

There is one circumstance, however, connected with this class of cases which, in my opinion, would render an operation for the removal of the stone justifiable, even in the face of the gravest forms of co-existing structural disease—that is, the

presence of acute pain which is otherwise incapable of relief. In such a case I am disposed to think that lithotomy, as a rule, is preferable. The reason for my thinking so is that spasmodic pain of exceptional character and intensity is generally occasioned by a stone in a contracted bladder, where crushing is less easily accomplished, and is not invariably followed, as I have seen, by that immediate sense of relief which usually attends lithotomy when performed under these circumstances. Immediate escape from agonising pain sometimes more than compensates for any shock occasioned by the operation necessary to give relief. It is the continuance of the same pain after the shock has been endured that we should be most wishful to avoid.

Stricture of the urethra is sometimes a complication of stone in the bladder. In one instance, in a middle aged man, the result was not satisfactory.

Seven days after the operation, and when the patient had left the Infirmary, rupture of the urethra, behind the stricture, and extravasation of urine, suddenly took place, and quickly caused death, in spite of free incisions wherever the vitality of the tissues was threatened. I saw this patient with Dr. Adam. Though the operation was extremely simple and easy, and the water in the aspirator, as I pointed out to my class at the time, hardly tinged with blood, it is possible that the manipulations may have further weakened a urethra which had long been diseased, and so contributed to the fatal result. Before performing lithotrity, I had dilated the urethra, so that the lithotrite passed readily.

I think if I had again a similar case to deal with, where the stricture was at all tight or chronic, I would prefer the cutting to the crushing operation; for with the latter it is impossible to avoid the contingency to which all persons suffering from stricture are somewhat liable—namely, peri-urethral abscess and extravasation of urine, and which in this instance caused the death of my patient. On the other hand, it is only fair to state that the extravasation might have been entirely unconnected with the removal of the stone.

The presence of saccules or recesses in the bladder undoubtedly presents a formidable obstacle in the way of lithotrity, and where they are known to exist lithotomy, as a rule, is indicated. Of the two kinds of saccules, viz., the one that is usually to be found above the inter-ureteral bar (Fig. 96), and which is formed by a general subsidence of the whole thickness of the bladder, and the other which consists of a hernial

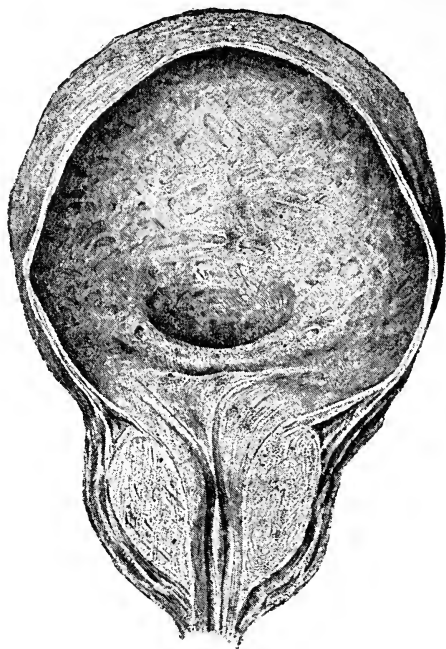


Fig. 96.

protrusion of the mucous coat through the meshes of the muscular (Fig. 97); the former is the more formidable to the lithotritist, as fragments are sure to fall into it after the first breakage of the stone, and then from their reduced size, it may be found absolutely impossible to seize them with the lithotrite. In one instance where this occurred to me, it was necessary to elevate the pelvis of the patient very considerably before I could

complete the operation which was thus rendered necessary. Dr. Pancoast, of Philadelphia, was present on this occasion, and was good enough to give me the suggestion. In spite of these difficulties, it is only right to say that the patient made a good recovery from the operation; but the existence of this saccule rendered him liable to cystitis and phosphatic deposits in the bladder. The hernial form of sacculation is more usually situated in other parts of the bladder, and for this reason is less to be feared. Under all circumstances, however, this is a source of risk, both with lithotrity as well as with lithotomy,

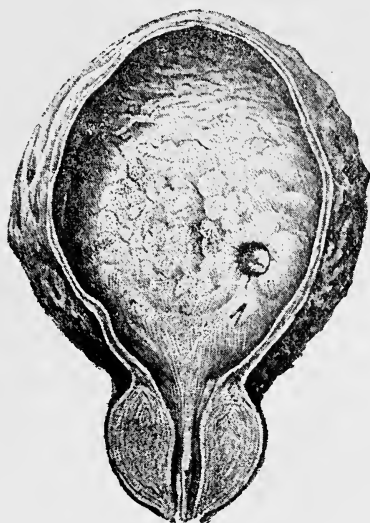


Fig. 97.

though with the latter to a lesser degree, and must not be lost sight of.

Dr. Alexander\* reports an interesting case of stone with sacculation of the female bladder; vaginal lithotomy was performed, and subsequently ligature and amputation of the sac, with a good recovery.

I am here reminded of an observation that suggested itself

\* *Liverpool Med. Chir. Journal*, July, 1884.

to me on seeing the *post-mortem* examination of a patient upon whom lithotripsy had been performed. On the completion of an operation, the amount of fragments removed should be roughly proportionate to the size of the stone, as determined by the lithotrite. In the case referred to, though the stone was a large one, only about seventy grains of uric-acid calculi were removed by several washings. As no more pieces could be felt, it was concluded that all had been removed. After death, the larger portion of the calculus was found completely concealed in a pouch, where it had probably originated the cystitis which proved fatal. The want of anything like a due relation between the fragments and the stone might, on a future occasion, lead to such precautions being taken as to bring about the discovery of a concealed fragment. In this case it is quite possible, had the sacculæ been suspected, the fragment might have been dislodged by placing the patient on his belly, or by adopting some other device, and then attempting to seize it with the lithotrite before it had a chance of returning.

There is a form of stone where the bladder becomes encoated with masses of phosphates entangled in thick tenacious mucus. This may be regarded both as a cause as well as a consequence of chronic cystitis. It is often seen after lithotripsy in the elderly, and is the source of much annoyance. I used to treat it by taking away as much of the deposit as I could with a smooth bladed lithotrite, and then having the bladder regularly washed out with some slightly acidulated lotion. More recently, in consequence of the liability to relapses, I have done more than this with good results. This consists in removing the phosphates with the lithotrite, and then scraping off the thick unhealthy mucous with a large-eyed bevelled catheter, made for the purpose for me by Messrs. Krohne & Sesemann (Fig. 98). The instrument should be used firmly but gently. It is astonishing what a quantity of unhealthy deposit may in this way be got rid of. This having been done, then washing out of the bladder will have a reasonable chance of keeping the

mucous membrane in a more natural condition. In all the cases where this plan has been adopted the results have been very satisfactory.

I have a few remarks to make in reference to the employment of lithotritry in children. Having regard to the good results obtained from lithotomy, it seems almost like heterodoxy to suggest resort to another operation. Such, indeed, was my own opinion until a few years ago, when I happened to be examining a number of calculi removed from children. Some of these stones were so small that it seemed to me they were capable of being pulverized by one or two grips of a lithotrite. As a preliminary to such a step, it was necessary that an



Fig. 98.

accurate calculation should be made of the size of the stone. Working in this direction, and making some experiments with small calculi of various composition, and lithotrites reduced in size, I came to the conclusion that stones not exceeding three-eighths of an inch in their largest diameter might, in children, be readily disposed of with the lithotrite. The following is an illustration of this practice:—

John J., aged 11, a schoolboy, during the summer of 1881, was several times at the Infirmary for irritability of the bladder, which was suspected to be due to a stone, though it could not be distinctly detected. On September 16th, I saw him, and put him under ether. I then felt and seized a uric-acid stone, three-eighths of an inch in diameter. A second grip completely pulverized it. In the course of twenty-four hours the fragments were passed spontaneously, and the bladder emptied of them. He left the Infirmary in a week, and has since reported himself as quite well.

This case is an example of what I mean by lithotrity in male children, of which I treated several with successful results.

The following are the conclusions I have formulated for my own guidance :—

1. In children, as in adults, it is essential that an accurate knowledge of the size and shape of stone should be obtained before any operation is decided upon. This information can be arrived at only imperfectly with the sound, but with precision by a small lithotrite. Volkmann's method of bimanual exploration of the bladder, with a finger of one hand in the rectum and the other hand above the pubes, may be practised. In thin subjects I have, in this way, been enabled not only to determine the presence and size of calculi within the bladder, but to diagnose deposits in the vesical walls. Exploration with the finger alone in the rectum is not of any service for this purpose.

2. Single stones, not exceeding three-eighths of an inch in any diameter, may be submitted to lithotrity.\* One or two grasps with the lithotrite will reduce them to pieces so small that they may be left to escape spontaneously by the urethra. Even aspiration is not necessary.

3. When, in children, stones, though small, are multiple or exceed three-eighths of an inch in any diameter, lithotomy is to be performed.

It is in restricting lithotrity, as applied to children—if so simple a proceeding can be dignified with the name—to the

\* The weight is stated of the following calculi in the Museum of the Royal Infirmary, where the greatest diameter did not exceed three-eighths of an inch.

No.	COMPOSITION.	WEIGHT.	SIZE.
92	Uric Acid and Phosphates . . .	3½ grns.	$\frac{1}{16} \times \frac{1}{4} \times \frac{1}{8}$
93	Urates and Oxalates . . .	9 "	$\frac{1}{2} \times \frac{1}{16} \times \frac{1}{4}$
106	Urates . . . . .	2 "	$\frac{1}{4} \times \frac{1}{4} \times \frac{1}{8}$
110	Uric Acid . . . . .	1½ "	$\frac{1}{4} \times \frac{1}{8} \times \frac{1}{4}$
127	Urates . . . . .	2 "	$\frac{3}{8} \times \frac{1}{4} \times \frac{1}{8}$
148	Urates . . . . .	4 "	$\frac{3}{8} \times \frac{1}{4} \times \frac{1}{4}$
149	Uric Acid . . . . .	2 "	$\frac{3}{8} \times \frac{1}{4} \times \frac{1}{8}$

limits indicated, that satisfactory results have been attained by me.

Surgeon-Major Keegan\* has recently added important testimony in favour of litholapaxy in male children. He has practised this operation largely in India, with results which have been highly satisfactory. The experience of lithotomy in children in this country has been so generally favourable, that I should not feel disposed to extend very materially the limits just mentioned. Many practitioners, who are expert lithotomists, would fail to find the same success in their application of the crushing operation to male children. I see that Mr. E. H. Fenwick† reports an instance which came under his cognizance where the bladder of a boy was ruptured in the course of a lithotrity. It is probable that we should have further examples of this if the field of lithotrity in male children were very much extended. In the instance just referred to it is stated that the rupture had probably been made by the evacuator used with undue freedom in a contracted bladder.

In reference to the after-treatment of lithotrity generally, there is not much to be said. A successful operation now leaves little more to be done than what is included under the terms warmth, rest, careful nursing, suitable diet, and a complete discharge of the urine at suitable intervals.

If the operation is followed by a high degree of local inflammation, we shall probably shape our course with special reference to the question of freedom of the bladder from portions of broken stone. If the symptoms become severe, and there is reason to suspect the presence of fragments, the re-introduction of the lithotrite as an explorer, and the immediate removal of the detritus, should any be discovered, is the most likely means of saving the patient from an otherwise inevitable fate. This has been done with success after the old method. The possibility, however, of such a contingency as incomplete removal

\* *Litholapaxy in Male Children and Adults*, Churchill, 1887.

† *Pathological Society of London*, Feb. 1, 1887.

must be remembered, in connection with any operation of lithotrity, since some part of the bladder may be rendered difficult of access, as previously mentioned.

It should not be forgotten that a calculus is a foreign body which, to a certain extent, the bladder has learnt to tolerate: but a broken calculus, together with the circumstances attending its fracture, sometimes proves capable of exciting the most urgent signs of its altered shape. I do not think it would be possible to compound a more inflammation-producing material than that I once inspected in a bladder, the ingredients being—a broken up uric-acid calculus, ammoniacal urine, pus, mucus, and blood, all having been maintained for some time at a temperature of about 100° Fahr. From consequences of this kind the introduction of Bigelow's proceeding has done much to preserve us.

In the slighter forms of inflammatory mischief after lithotrity, some light warm application to the abdomen, such as a bran poultice, generally proves most grateful. If there is thirst, there is no better diluent than barley or soda-water.

## FORTIETH LECTURE.

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### ON STONE RELAPSES AND REPEATED OPERATIONS—MOTION- LESS STONES.

WE have now to consider the circumstances under which recurrences of stone in the bladder take place in connection with the necessity that sometimes arises for a repeated operation.

A review of the whole subject of the operative treatment of stone in the bladder renders it tolerably clear that cutting operations, either in children or adults, have to be repeated far less frequently than crushing ones. Nor is this difference to be entirely accounted for by the fact that success as a lithotomist is more easily and generally attainable than as a lithotritist. This point could be very easily demonstrated if it were desirable by taking the respective figures of individual operators, whose experience and dexterity cannot for a moment be called into question. We must, therefore, look beyond the mere mechanism of these two operative procedures with the view of satisfactorily explaining the difference to which I have just referred.

In a recent paper, Mr. Day\* has very carefully analysed the cases of repeated lithotomies at the Norfolk and Norwich Hospital, taken from a series of 1,125 specimens in the museum, which can be examined by all. I do not think that it would be possible to find more satisfactory data from which to draw conclusions. Mr. Day has grouped the causation of the recurrences into four classes, a division which seems to me to be quite warranted by other clinical experience.

\* *British Medical Journal*, Feb. 13. 1886.

*First.* Cases where the reformation of a stone has, as far as it is possible to determine it, been quite independent of the previous one. Some years ago I cut a man for stone; just as he was about to leave the infirmary he had a most acute attack of renal colic, with hæmaturia, and passed a uric acid calculus almost as big as an ordinary marble. Had this stone remained in the bladder it would probably have grown by the aggregation of phosphates upon it. It will be seen how easily I might at a later stage have been exposed to the charge of having left a stone in the bladder at the previous operation. Similar illustrations of this kind of recurrence, quite independent of the selection of the operation or the manner of its performance, might easily be furnished.

*Second.* Instances where stones have not been detected at previous operations. After a stone has been removed from the bladder by lithotomy we cannot be too careful in ascertaining whether this is all. For this purpose the finger or a sound should be used. In the following case in my own practice I have no doubt this accident happened in spite of careful exploration.

T. S., aged 62, was admitted into the Royal Infirmary in July, 1884, suffering from symptoms of stone. On examination it was found that the bladder contained more than one calculus. The prostate was large, and considerably impeded the introduction of the necessary instruments for sounding and exploring the bladder. I selected lithotomy, with the view not only of removing the stone but of improving the condition of the prostatic urethra.

On July 25, 1884, I performed lateral lithotomy, and made a free section of the prostate, which, by the elevation of its floor from hypertrophy, rendered access to the bladder difficult. With the forceps I removed two ounces and a quarter of stone, which broke in removal. Allowing for portions that were lost during this piece-meal extraction, the stones must have weighed about three ounces. The calculi were chiefly phosphatic, as will be seen, but with some urates. The bladder was carefully explored both with straight and curved forceps, with the finger, and finally was washed out from the wound with a Higginson's syringe. The section of the prostate referred to rendered

these various manipulations quite easy. One of my bladder drainage tubes was introduced. The patient made a good recovery, and left the Infirmary apparently well, with a sinus through which urine passed in small quantities. Considering the time the drainage tube had been retained for improving the prostatic urethra, I did not attach any importance to this, and, guided by other experiences, assured the patient that the wound would soon heal.

After he left the Infirmary, though he returned to his work, his bladder never quite recovered itself; the wound did not entirely close, and he suffered more or less at times from chronic cystitis. These circumstances led me to believe that the bladder was sacculated, but I could detect nothing more. In August, 1885, my house surgeon, Dr. Bristow, sounded him and thought he felt another stone. On a subsequent examination I confirmed this diagnosis, and on September 12, 1885, I again performed lateral lithotomy for him on the old line, in the course of which there was a small sinus remaining from the previous operation. Surgeon-General Mackinnon, C.B., of the Army Medical Department, and Dr. Frank, of Cannes, were present. The operation was perfectly easy, the access to the bladder through the prostate being much improved, for on this occasion the largest sized staff was readily passed. I removed a stone which, with its encrusting shell of friable phosphates, weighed one ounce. A double bladder tube was introduced for drainage and retained for a few days, when it was removed; the patient was up on the twenty-third day, and he left the Infirmary exactly five weeks after the operation, with the wound soundly healed and the functions of the bladder completely restored. I was somewhat puzzled at first to explain satisfactorily the course of events in this case. I have mentioned the various processes employed in the first operation, so far as improving the entrance into the bladder was concerned, for the purpose of showing how thorough an examination of the interior of the viscus was necessarily made, both by the finger and different kinds of instruments. It seemed almost impossible that a stone, however sacculated, could, under these circumstances, have escaped detection. Still, on the other hand, when I considered that the wound never completely closed after the first operation, and that in the interval the patient was never free from signs of vesical irritation, it seemed to be probable that the whole of the stone had not in the first instance been removed. A careful examination of the stone itself further convinced me that this was the true explanation. If the mass of calculous material removed at the second operation is carefully

examined, it will be seen to consist of two different strata, as geologists would say. The inner portion or nucleus—of the size of a flattened French prune—evidently belongs to the same period and formation as the calculi removed at the first operation, the outer friable crust of phosphate being clearly of recent production. I have no hesitation in concluding that a stone of considerable size escaped detection and removal at the time of the first operation, even in spite of all the precautions which the state of the prostate prompted.

I am not aware of anything of a similar kind happening in connection with other operations of lithotomy that I have performed. It may at first sight appear difficult to understand how a stone can be so embedded in the walls of the bladder as to be undetectable either by the finger or the sound. The examination, however, of some specimens clearly shows how this can be.

*Third.* Stones formed on fragments left behind from previous operations. This, of course, may happen after a lithotomy, but more frequently after lithotrity, unless the greatest care is exercised in ascertaining that the whole of the stone has been removed. Commenting upon this class of cases, Mr. Day remarks, “always search the bladder thoroughly as a matter of routine.” The liability to this accident is now considerably less than it used to be owing to the assistance rendered by the aspirator, not only in removing, but also in detecting fragments of stone, however small and concealed they may be, in the inequalities of the bladder. In my own practice of crushing I can only recall three instances where stones reformed and I had to crush again. This does not include some cases where, though there was no stone formed, yet soft putty-like formations of mucous and phosphates occasionally took place, which required to be withdrawn with the lithotrite or wash bottle. The only instance I know of in the personal experience just referred to where the recurrence of the stone was clearly due to fragments left behind by me was the following. I am indebted to Professor George Buchanan, of Glasgow, for acquainting me

with the subsequent history of this case, as well as for the drawing of the stone he removed successfully by lithotomy.

D. L., aged about thirty, was admitted into the Royal Infirmary in May, 1882. He had suffered from symptoms of stone for five years. On examination with the sound a large stone could be felt. On May 30th, I had the patient placed under ether, and was prepared either to cut or to crush. On introducing the smooth-bladed lithotrite I found a stone of moderate hardness, having a diameter of very nearly three inches. Though the stone was exceedingly large, yet there was sufficient room in the bladder to allow of the requisite manipulation with the lithotrite. I therefore determined to remove it by Bigelow's method. As the stone was too large to permit of its being cracked across with the lithotrite, I contented myself with first chipping away at its circumference until I had so reduced it in size that I could grasp it, and at the same time close the screw of the instrument. In this way I first broke it across with the fenestrated lithotrite, and then pulverized it with the smooth-bladed one. The operation lasted two hours and ten minutes. The patient made a good recovery, and thirty-two days after the operation left the Infirmary to resume his occupation. The calculus was composed of phosphates with a small admixture of urates. The fragments, when dried, weighed two ounces and two drachms.

The following year this patient was admitted into the Glasgow Royal Infirmary with symptoms of stone. On Nov. 10th, Professor George Buchanan performed lithotomy, and removed a stone weighing one ounce and forty-eight grains. On section the stone presented the appearance represented in Fig. 99. An examination clearly shows that the stone was formed on nuclei furnished by pieces of a uric acid calculus which eluded detection at the time of the previous operation. The patient made a good recovery, and no further recurrence has taken place.

This is the only instance of the kind I know of that has occurred in my practice, which now includes considerably over one hundred cases where crushing has been practised. It also indicates the important lessons that may sometimes be drawn from the examination of sections of stones. For years past I have invariably adopted the practice of having all calculi cut

across by an experienced lapidary.\* Much useful information has thus been obtained which otherwise would have remained literally buried.

*Fourth.* Vesical stones arising out of a more or less permanent condition of cystitis or catarrh. This is the class of cases which I believe furnishes the most frequent examples of recurrences after lithotrity, and arises out of structural and functional alterations in the bladder itself, which cannot be said to exist in young subjects. If when the wound has healed after a lithotomy, or the irritation connected with the use of the



Fig. 99.

lithotrite subsided, the bladder is prepared to perform its function in a natural manner, there is but little risk of the development of those local conditions which are known as being favourable to the formation of vesical stones, whilst, on the other hand, if the bladder is more or less incompetent to expel, there is a continuing cause for inflammation and decomposition of urine, which are the most important factors in the creation of phosphatic stones.

I feel very decidedly that where we have the later conditions

\* Mr. Bryson, Princes Street, Edinburgh.

to face, at all events in those instances where recurrences take place after lithotrity, in spite of the most continued and scrupulous care of the bladder after the stone has thus been removed, lithotomy and bladder drainage is indicated as being the best means of affording a permanent relief. Since within a comparatively short period I have performed lithotomy on two adults who had been previously crushed, I believe, on more than one occasion. In each instance masses of soft phosphatic mortar-like substance were removed, drainage was employed, and the patients made excellent, and so far, I believe, permanent recoveries. Reference to the treatment of this condition has already been made in connection with my remarks on lithotrity (page 506). Belonging to the class of recurrences now under consideration is the following instance, which illustrates several of the points I desire to make prominent.

A gentleman about sixty, of a decidedly gouty habit, consulted me in 18—. I detected a moderate sized uric acid calculus lying behind his large prostate, which I removed by crushing. When collected the fragments were entirely urates with no phosphates. After a period of some months' peace, his large prostate began to trouble him for the first time. He found he could not empty his bladder completely, and this gave rise to more or less catarrh. Three years after the removal of the uric acid calculus he came to me again, when I found he had two stones of moderate size. These I also removed by crushing. On examination, unlike the previous calculus, they were entirely made of triple phosphates, and did not contain one particle of urates in their composition. The former was what I would call a diathetic calculus, and indicated the constitutional tendency; whilst the latter were vesical, and produced by mere local causes. Unless this patient is extremely careful in keeping his bladder cleaned and emptied, I should be afraid of his producing some more phosphate stones.

I have seen so much improvement follow upon cystotomy and drainage, not only in cases of recurring stones, but also in those of large prostates, where the conditions are by no means dissimilar, that I have no hesitation in recommending this pro-

cedure in those instances where lithotripsy has proved a failure probably for the reasons that have just been assigned.

Amongst the contributing causes for the recurrence of stone enumerated under this heading, must be included one that has not, I think, received sufficient attention. I refer to the damage done to the walls of the bladder by the continued pressure of a stone, which by reason of the conformation of the bladder or prostate is rendered almost absolutely stationary. The popular notion that a stone in a bladder is something like a die in a dice-box no doubt applies to a considerable number of cases; in these the symptoms are usually well marked, and whatever operation is selected is followed by satisfactory and permanent results. On the other hand, motionless stones are capable of inflicting by their growth and pressure such structural damage upon the soft parts in immediate relation with them as seriously to compromise subsequently whatever treatment is resorted to for their removal. This is a point well worthy of our consideration in determining the appropriate treatment in every case of stone in the adult male that presents itself.

## FORTY-FIRST LECTURE.

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### VARICOCELE — TREATMENT — PALLIATIVE AND RADICAL — AMPUTATION OF PENIS.

VARICOCELE is a morbid condition of the spermatic cord which so often incidentally comes under notice in connection with diseases of the urinary system, that I purpose making reference to it.

The term is applied to a dilated or varicose state of the veins of the cord, and consequently, like similar affections of these bloodvessels in other parts, it varies much in degree and in the amount of inconvenience it causes. You will often observe that the symptoms attending varicocele are in no way proportionate to its extent; that is to say, you will find patients with a small varicocele complaining very much, whilst, on the other hand, some large ones appear to occasion little or no inconvenience. And this points to the relation in which the affection stands to the nervous system, in causing effects which are seen in the dismal forebodings so frequently indulged in by the subjects of it. Hence, in treating it you will do well to remember Sir James Paget's observation, that it may be "a mental error, not a bodily one, that needs cure."\*

In addition, however, to being a source of annoyance and ill-health to some persons, this affection is frequently a barrier against their entrance into various employments and public services. The following table, for instance, shows the number

\* *Clinical Lectures and Essays.*

of rejections for varicocele in the recruiting service of the British army for the past few years.

Year.		Rejections.		Ratio per 1,000 Rejected.
1879	.....	630	.....	14·77
1880	.....	742	.....	16·09
1881	.....	800	.....	16·86
1882	.....	764	.....	16·82
1883	.....	1,086	.....	18·27
1884	.....	1,060	.....	15·85

Mr. R. W. Watson, writing on the same subject, remarks,\*

I wish to draw attention to the prevalence of varix and varicocele at the Greenwich School, as shown in the report of causes of rejection of boys for the navy, published in the *Journal* for the 19th May. Varix being a disease of adult life, we may assume that most of the cases were varicocele. All the boys were examined, and passed as free from disease at thirteen years of age. Out of 864 boys, 43, or five per cent., were rejected for this; or, out of the 70 per cent. rejections, 7 per cent. were due to this disease. On looking closer at the report, we find that the disease is very unevenly distributed in the school. In certain classes, numbering 630, only 3 per cent. were affected, while, in the classes numbering 234, mentioned below, 10·25 per cent. were affected. Amongst the bricklayers, kitchen boys, and hair-pickers, the proportion affected was 12·5 per cent; mat-makers, 11 per cent.; select classes, pupil teachers, and knitters, 10 per cent.; and painters and sail-makers, 8·3 per cent.

As a considerable proportion of varicoceles can be completely and permanently cured, these figures show how large a number of persons may be rendered available for the public services, as well as for other occupations of life for which they were previously disqualified.

A varicocele is readily recognized. It usually commences shortly after puberty, and is often assigned to some violent exertion, such as a strain. Some persons appear to have an hereditary predisposition to dilatation of the veins, and in these we have the disease appearing with apparently no other explana-

\* *British Medical Journal*, June 2, 1883.

tion to account for it. To the feel, the dilated veins have been aptly likened to a bag of worms. In extreme cases the veins almost conceal the testicle, but it is rare that they occasion any structural alteration in it. Like other varicose veins, they are influenced by the position of the body; when unsupported, and after much standing or walking, they cause a sensation of weight, if not of positive pain to be felt. A varicocele is not likely to be mistaken for anything else. The only points in which it resembles hernia, so far as I have noticed, are, that it partially disappears when the patient lies down, and that something like an impulse on coughing may now and then be obtained.

In reference to the causation of varicocele, it seems to be due to some impediment to the return of the venous blood which is of more frequent existence on the left than on the right side of the body. Dr. J. H. Brinton,\* of Philadelphia, has observed the marked deficiency of valves in the left spermatic vein as compared with the right. Dr. Brinton was good enough to show me his dissections bearing upon this point, which appeared to me to be quite conclusive. It has also been urged that the left spermatic vein is more liable to pressure from accumulations of faecal matter in the sigmoid flexure of the colon than the right.

The treatment of varicocele is palliative and radical. In the former, our object is, by artificial means, to provide a support for the distended veins, to prevent them enlarging or producing symptoms by their distension. In the latter by setting up adhesive inflammation we endeavour to bring about their obliteration. These principles are similar to those we recognise in the treatment of the more familiar instance of varicose veins as seen in the legs.

It is the practice to apply support to the veins by a variety of expedients. Of these I may mention the late Mr. Wormald's plan, the description of which I will give

\* *American Journal of Med. Sciences*, July, 1856.

in his own words, as being, from its simplicity, useful for reference:—

A ring, about an inch in diameter, made of soft silver wire, of a suitable thickness, was padded and covered with washleather. Through this I drew the lower part of the scrotum, whilst the patient was in the recumbent position and the veins comparatively empty; then pressed the sides of the instrument towards each other with sufficient force to prevent the scrotum escaping. The use of this instrument every morning before the patient rose from his bed enabled this gentleman to walk nineteen miles on the third day after the first application; and

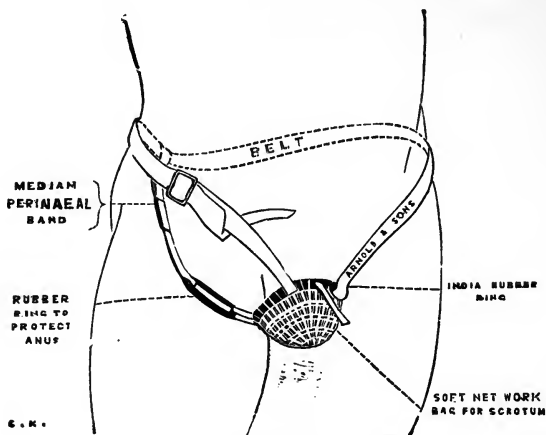


Fig. 100.

although he has for six years worn an instrument of this description, he has never experienced the least inconvenience."\*

Then we have the ordinary suspensory bandage, which in slight cases suffices. In more extreme varicoceles there are certain modifications of this appliance, which will be found useful. Recently, Mr. Keetley has described a form of suspensory bandage, which is figured in the accompanying sketch† (Fig. 100). It is made in three sizes, and can be recommended. A method of suspending the testicle and giving

\* *London Medical Gazette*, April 28, 1838.

† *The Lancet*, May 24, 1879.

support to the enlarged veins of the cord was described by Mr. Morgan some years ago. As I have used this apparatus (Fig. 101) successfully in some bad cases, I will give Mr. Morgan's description of it\* :—

The testis is shown in the suspender, which consists of a piece of web, about  $3\frac{1}{2}$  inches wide at one end,  $4\frac{1}{2}$  inches long, 4 inches wide at the other, and cut gradually tapering to the narrower end. A piece of thick lead wire is stitched in the rim of the smaller end, and the sides are furnished with neat hooks, a lace, and a good tongue of chamois leather, two tapes being sewn along the entire length of the web, which are afterwards attached to the suspending belt. The application is easily

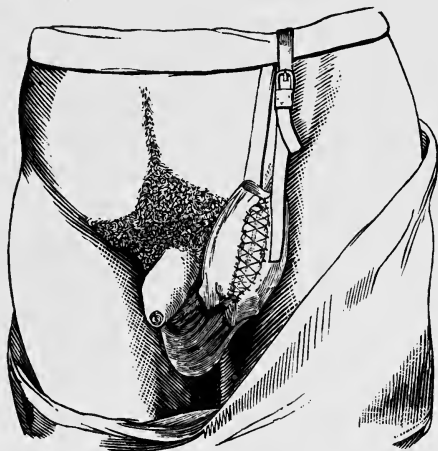


Fig. 101.

made by the patient in the morning before rising; and, when the parts are relaxed, laying the affected organ, while in the dependent position, in the suspender, and lacing up the hooks with a moderate degree of tightness, then raising it and attaching the tapes to the suspending belt previous to rising from bed. A certain amount of discretion must be used as to wearing the suspender for the first few days; it should not be kept on constantly; the parts should be sponged night and morning with cold water or a cold lotion, used so as to fortify the skin, as any chafing must be avoided. In all cases the suspender is best omitted at night. So great is the convenience afforded, that the gentleman from whose case the illustration is taken is now shooting in Scotland, able to enjoy himself and go through a day's hard walking without inconvenience.

\* *Dublin Quarterly Journal*, vol. xlviii.

Some practitioners prefer treating this affection by means of a truss, with a pad over the external abdominal ring. Care should be taken to select an instrument capable of giving sufficient support to the veins without exercising such an amount of pressure on the artery as to stop circulation.

I will now pass on to notice the circumstances under which it is justifiable to resort to operative measures, with the view of permanently obliterating the enlarged veins. Dr. Ogilvie Will\* sums up the circumstances which would justify us in resorting to an operation as follows :—(1), If the varicocele be very large or increasing; (2), if the testicle be atrophied; (3), if acute pain be complained of; (4), if the patient be disqualified from entering the public service; (5), if the stability of the mental faculties be endangered. Where the testicle shows any signs of commencing atrophy, Mr. Barwell† has shown that an improvement in its condition immediately follows the successful application of radical treatment. My own experience is corroborative of this.

Various means have been resorted to for effecting obliteration of the veins, including the subcutaneous ligature, as practised by Mr. Henry Lee, the introduction of needles and compression with twisted thread, and subcutaneous division with the knife. These proceedings are fully treated of in the text-books. Mr. A. P. Gould‡ advocates the employment of the galvanic écraseur for the obliteration of the veins, and illustrates its feasibility by several successful cases. This mode of operating appears to me to possess certain advantages, both as regards safety and efficiency. In conducting these operations care must be taken not to interfere with the vas deferens, which by reason of its whipcord-like feel, is readily kept out of harm's way.

I will describe a mode of operating which, without prejudice to other procedures, has given me results which have been very

\* *The Lancet*, May 15, 1880.      † *The Lancet*, June 12, 1875.

‡ *The Lancet*, July 17, 1880.

satisfactory. It consists in exposing the cord by a vertical incision about two inches in length, and separating the veins which are most prominently varicose. These are each tied in two places with a catgut ligature. Usually three or four main veins, or a bunch of them, require to be so dealt with. In addition, it will be observed that there are a number of small veins in plexuses or bundles, in close proximity with the epididymis, which cannot be obliterated in this way; these I destroy with a few light touches of the thermo-cautery, taking care, while this is being done, to protect the vas deferens by holding it from behind, between the thumb and index finger of the left hand. The operation is conducted antiseptically. No sutures are introduced, and the wound is left to heal by granulation. I have now been performing this operation for some years, and I am not aware of an instance in which there has been a return of the varicose condition of the veins; the cicatrix which results is of a contractile nature, such as usually follows wounds inflicted by burning, and gives a feeling of firmness to parts which previously were complained of as being unnaturally lax. It is, I am sure, a matter of great importance, in view of preventing a return of the disease, to destroy the small varicose veins, which can only be seen and not felt. If this is not done, obliteration only means driving the disease into new channels, already preparing to dilate. Where, however, there are no plexuses of minute varicose veins which cannot be included in the ligatures, the cautery is dispensed with.

If antiseptic surgery had done nothing more than give precision to surgical operations, and careful attention to detail in their after-treatment, it has effected much. If it is wished to deal with a part that is diseased, and to obtain the fullest success, it almost amounts to a condition that it should be seen as well as felt. I have operated on the spermatic veins in this way a great many times. In one instance only was any delay or danger imported into the case. This was an attack of erysipelas, which was directly traceable to the patient sitting on a draughty

water-closet very shortly after the operation was performed. Several patients thus operated on have since entered the public services, having previously been disqualified.

I see that Dr. Henry, of New York, and Dr. Levis, of Philadelphia, have revived the old practice of removing with a clamp portions of the scrotum for the purpose of giving a permanent support to the enlarged veins of the cord, with the object, I presume, of effecting their obliteration. Though I have had no experience in this mode of operating for varicocele, I am rather disposed to doubt its efficacy by reason of the remarkable reproduction of the scrotum after it has been completely destroyed by sloughing, the result of urinary extravasation. I recorded a case in 1875 of sloughing of the scrotum where the testicles were exposed and eventually covered in by granulation. This patient, Charles W——, happened recently to be in the infirmary under my care for stricture. His scrotum, which was completely destroyed by sloughing, has been, as I pointed out, entirely reproduced; if anything, it is rather more lax than natural. This is by no means a solitary example.

Mr. Mitchell Banks\* has practised in a number of cases the following procedure: "the parts having been carefully shaved, an incision about two inches in length was made over the spermatic cord, and the veins were readily isolated. They were tied across in one group with catgut passed beneath them with an aneurism needle at two places, the ligatures being about half an inch from each other. The intervening portion of vein was then cut out. Only two antiseptic dressings were required, and in five days the wound was healed. A hard lump remained above and below it, indicating that clotting had taken place."

This does not differ very essentially from what I have described; I prefer retaining the whole of the veins after their obliteration with the ligature or cautery, as I think we thus obtain a firmer and more continuous cicatrix. As Keyes† has

\* *Clinical Notes*, 1884, p. 114.

† *New York Medical Record*, Feb. 20, and Sept. 18, 1886.

pointed out, there is a risk of the action following operation on a varicocele not being sufficient to secure permanent obliteration, hence he urges the use of silk as a ligature instead of catgut. In connection with the bandaging and supporting of a varicocele after operations of this kind, Sir William MacCormac has figured a pelvic support,\* by means of which this important part of the treatment can be much facilitated as well as rendered precise.

Amputation of the penis is occasionally necessary for malignant disease. The plan generally practised consists in sweeping off the organ at a point above the disease, and then allowing the stump to heal by granulation. To prevent retraction of the urethra, the mucous membrane is slightly slit up along its under surface, and the edges are then secured by sutures to the sides of the wound. This mode of proceeding is open to two objections: first, the orifice of the urethra is inconveniently situated when the amputation is close to the body, as urine, instead of being ejaculated, trickles down over the scrotum, and much distress by excoriation is thus occasioned; second, the cancerous organ is only incompletely removed—that is to say, more or less of the crura, possibly infected, is left behind. To remedy this another proceeding has been adopted which may be found suited to some cases. It consists in making an incision to embrace the root of the penis, and from the lower angle of the ellipse thus formed continuing the incision to half an inch in front of the anus, so as to bisect the scrotum. The spongy and cavernous bodies are separated and a urethra of two inches and a half is left. The crura are then dissected out from their attachments to the ischia, so that in this way the penis is completely removed by its roots. The urethra is next slit up and attached to the margins of the perineal wound. The remainder of the wound is closed by the ordinary interrupted suture. In the case from which this description is taken, on the completion of the operation, a sort of vulva was formed, the patient eventually urinating with an excellent stream.

\* *British Med. Journal*, March 13, 1886.

There is another mode of amputating the penis which presents certain advantages. It was first suggested to me by Mr. Chauncy Puzey. It consists in performing a Cock's operation, so as to ensure the patient passing his urine through the perineal wound. When this has been accomplished, and the stream of urine diverted, amputation of the penis may be performed as close to the body as possible, and the stump left to heal over by granulation. In this way the trickling of the urine from the cut extremity of the urethra over the scrotum is avoided, the patient micturating through the perinæum just as comfortably as he does after Cock's operation. It is necessary in these cases to instruct patients in regularly catheterising their perineal opening so as to prevent any contraction taking place. I have practised this plan with a slight modification, as in the following instance.

R. D., æt. 51, was admitted into the Royal Infirmary on May 25th, 1888, suffering from epithelioma of the penis, of nine months duration. There was one enlarged gland in the right groin. On the 29th the membranous urethra was opened on a staff and a drainage-tube passed into the bladder through which the urine was deviated. This having been completed, and the whole of the urine passing by the perineal wound, amputation of the penis was performed a week afterwards by lateral flaps close up to its connection with the pubes. The urethra was closed with a couple of stout catgut ligatures, just like an artery, when the flaps were adjusted over it as after an ordinary amputation. The gland in the groin was also removed. The patient left on July 25th, passing urine through the perineal wound, the stump of the penis having soundly healed. The patient was instructed to catheterize the perineal opening for some time.

## FORTY-SECOND LECTURE.

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### ON SEMINAL AND MUCOUS DISCHARGES FROM THE URETHRA— TRUE AND FALSE SPERMATORRHÆA.

FEW practitioners, whether more particularly engaged in the treatment of genito-urinary affections or not, do not meet with instances where persons seem to be almost demoralized by symptoms such as are here referred to, which, as a rule, are quite out of proportion to their assigned causes. It is impossible for anyone to be brought in contact with cases of this kind without being struck with the pernicious effect which is caused by advertising and the gratuitous circulation of a certain kind of literature upon the minds of sensitive individuals who may feel conscious of having committed, perhaps at early periods in their lives, some sexual indiscretion. The perusal of such literature seems to produce tolerably uniform effects, and to be generally successful in bringing its victims within a reasonable distance of the verge of despair. It is remarkable how the law of the land tolerates for a moment the dissemination of such injurious adulterations under the form of scientific medical literature.

The subject, however, which we have to deal with resolves itself into the consideration of the circumstances under which the seminal fluid is discharged in an unnatural and hurtful way, and the conditions resembling it. By the somewhat hackneyed term of spermatorrhæa, I take it, we understand that the semen is emitted in an abnormal manner, that in consequence of this the patient's health is sensibly and obviously impaired, and that by the continuance of this disorder he practically becomes

impotent as a procreative being. At first sight we might feel disposed to believe that what I have described represents a common derangement, if we merely took the statements of patients without due criticism. If, however, we fall back on our individual experiences and carefully analyse the cases submitted to us as instances of spermatorrhœa, we must come to the conclusion that the disorder, in any hurtful sense, is a rare one. The grounds which are generally put forward as indicating that an individual is suffering in this way are, as a rule, of a threefold kind ; (1), that the urine contains evidence that the semen is voided imperceptibly in this way ; (2), that after an expulsive exercise, such as defœcation, where it is presumed the seminal vesicles may be subjected to pressure, the fluid escapes in an almost pure form from the urethra ; and (3), from the patients experiencing certain disordered sensations, or from his observing certain physical signs, which in the absence of other explanation, leads him to infer that his case must be one of spermatorrhœa. Each of these three indications may be pointed to in some instances as having an individual existence, whilst in others they may be more or less combined. Fortunately our methods of testing each one of these conditions have become so precise that I cannot imagine any error arising or there being difficulty in drawing distinctions between what is real and what, on the other hand, is merely presumed or suggested.

That semen may be incontinently and hurtfully discharged in the way that I have just indicated under headings (1) and (2), I have not the least doubt, but that a person can suffer in the way referred to under heading (3) and yet no physical proof be afforded of the abnormal presence of the presumed cause, is at once at variance with common-sense. Some years ago I had the greatest difficulty in persuading a gentleman, about thirty-five years of age, that he was not suffering from spermatorrhœa because his hair was growing prematurely grey. He got this notion in his head from some source or other, and a consider-

able time elapsed before we induced him to abandon so preposterous an idea. Then he got married, and male twins were the first result of the union. This case at the time much impressed me with the mental demoralization the terms "spermatorrhæa" and "impotence," when adroitly and mischievously used, are capable of effecting even in those whom we may regard as not being particularly susceptible.

The distinguishing of true cases of spermatorrhæa from false, by the use of the microscope and the examination of the urine, presents no difficulty whatever. But what constitutes the false cases of spermatorrhæa, and under what circumstances are these presented to our notice? Let me remind you of some of these by taking illustrations with which most of us are familiar. First, the discharge of a little glairy mucous from the urethra at the close of micturition or after a stool, particularly after a constipated one. Now the individual takes no notice of this, it is so slight in amount, until he accidentally gets hold of some of the literature I have referred to. Then he has spermatorrhæa, with the sure prospect of impotence. He becomes from that moment wretched and suspicious. He pulls away at his penis for the purpose of testing the amount of secretion half a dozen times a day, and succeeds in converting a natural moisture into an appreciable drop, which becomes the very bane of his existence. The next individual may or may not have had his mind poisoned, but one day he sees something in his urine which he thinks very remarkable, if not ominous. He accordingly puts some urine in a glass, and discovers after letting it stand for a little time, that a thin flocculent cloud settles down. The natural film of mucous, possibly a little in excess, is mistaken for spermatorrhæa. The third patient is one who has had some previous urethral trouble in the way of a chronic urethritis or gleet, and has accustomed himself to look at his urine from time to time. He sees small white thread-like bodies floating about, which he at once concludes are spermatozoa, whole, as well as in various degrees of mutilation and

deformity. If he is not at once set right upon this point, he sooner or later gets off the line and falls into the hands of those whose trade it is to foster such delusions.

I need not say one word more about the detection of what I would refer to as the fallacies connected with spermatorrhæa and the impotence which is, as a rule, associated with it. The microscope and the test tube furnish us with reliable means of distinguishing between what is true and what is false; nor will the latter require any special allusion, so far as treatment is concerned, as the conditions which may thus shew themselves have already been referred to in other parts of this course.

A few words will be devoted to what I would speak of as true spermatorrhæa, which may shew itself as emissions provoked by the slightest and most trivial forms of sexual excitement, and in the incontinent escape of the seminal fluid, either with the urine or independently, as a consequence of straining, as in defæcation. As a rule the discharge of semen under these circumstances is to be associated with an enfeebled condition of the parts rather than as the result of a general plethora. Of the contributing causes of true spermatorrhæa, there can be no doubt that those having reference to the abuse, in some form or other, of the sexual function are by far the most common. Of these I need not speak in detail.

But though spermatorrhæa may be excited in this way, the disorder is sometimes rendered difficult of cure by reason of the relaxed and over-sensitive condition of the part primarily involved—namely, the deeper portion of the urethra corresponding with the opening of the ejaculatory ducts. When this is the case some local treatment may be necessary in conjunction with general measures calculated to improve the nerve tone of the individual. I have sometimes found that a local astringent applied to the urethra in the form of an injection, and regularly used for some time, will permanently arrest discharges of this nature, so far as it is possible to do so. In conjunction with this treatment I have also found the administration of a moderate

dose of the extract of *Cannabis Indica* at bed time of service. Many cases have entirely yielded to simple management of this kind. In a few others I have resorted to the use of Lallemand's *porte caustique* to the deeper urethra with permanent advantage. This remedy must be used with care, otherwise a sharp attack of urethritis and orchitis may supervene. In several undoubted cases of spermatorrhæa which have resisted all other kinds of treatment this proceeding has proved entirely efficacious, and I have had no occasion to regret its adoption. It is, however, a potent remedy, and must be used cautiously. In connection with this subject I would take the opportunity of mentioning a case bearing upon a method of treatment which, so far as I know, is unique.

Some few years ago a gentleman, aged thirty-five years, consulted me for a stricture. His history was briefly this: shortly after puberty he commenced to suffer from spermatorrhæa, which seemed to have severely taxed both his mental and bodily powers; for this he underwent various kinds of treatment by different surgeons, both at home and abroad, including the use of the *porte caustique* by an eminent French specialist, but all this was to no avail. Finally, he was told that there was nothing left for him but castration. This he was loth to undergo. His experiences of urethral operations having thus become considerable, he determined to produce a stricture of the urethra, as near as he could guess, in front of the seminal orifices. For this purpose he introduced a piece of lunar caustic in the eye of a catheter about six inches down the canal; this was followed by a violent inflammation. However, a few weeks after this he had the satisfaction of finding out that a stricture was forming, which when I saw him had been in existence, as far as I could make out, for about six years. He had certainly got rid of his seminal discharges, whatever they may have been, but he now was commencing to void his urine in drops. I dilated a tight stricture for him up to a No. 7 or 8 English size, when he thanked me and disappeared. I have not since heard of him. He frequently boasted to me that he had the best of the bargain, as it was better to have a stricture than either no testes or useless ones. He was a cool, calculating individual, with a sufficient knowledge of surgery to make him dangerous, but I had no reason whatever to doubt his story.

I never heard before of a person deliberately proceeding to make a stricture for himself, though in this instance there appears to have been some provocation. That a stricture does not necessarily prevent that form of spermatorrhæa which shows itself in incontinent emissions is evidenced in the case of a patient referred to on page 33, who, though he had a tight stricture, frequently suffered from the presence of spermatozoa in his urine; this, however, was invariably preceded by lascivious dreams of which he was conscious. The case I have just recorded, where a stricture was provoked for the purpose of stopping a spermatorrhæa, though a suggestive one, can hardly be regarded as a line of treatment to recommend. The remedy, as a rule, would be found worse than the disease, even if the former could be depended upon to produce the desired results.

## FORTY-THIRD LECTURE.

---

REMARKS ON SOME MALFORMATIONS, CONGENITAL AND OTHERWISE, AFFECTING THE URINARY AND GENITAL ORGANS—  
CYSTOCELE—CIRCUMCISION.

IN drawing attention to some of the commoner deformities met with in the genito-urinary apparatus I shall do so relatively to the practical applications of surgery for their relief, rather than with any desire to discuss their relations with many important questions bearing upon the development of this portion of the body. The subject of hermaphroditism, for instance, is of much interest in connection with the latter consideration, though there is but little to be said of it which would be of service to you to know in your capacity as practitioners of surgery, at least so far as the remedying of this class of deformities is concerned.

An urinous discharge from the navel is occasionally met with, and may be due to a patent condition of the urachus. This we know is a structure extending from the apex of the bladder to the umbilicus, and retains the tubular character of the allantois, with which it is in connection till about the thirtieth week of foetal life. Subsequently it becomes obliterated, and ceases at birth, except in some few instances, to have any tubular connection with the bladder. Where the patency of the tube remains after birth the individual is to all intents the subject of an urinary fistula in a position which occasions much inconvenience. To effect a closure of this opening various means have been employed, including the cautery and the occlusion of the sinus by vivifying its walls with the knife, and by the subsequent introduction of sutures. As in the treatment of

other urinary fistulæ, the first thing to ascertain is that there is no mechanical obstacle to the escape of urine along the natural channel, care must be taken that the latter function is not impeded in the male by a phimosis, a contracted meatus, or a urethral calculus. These are the commoner obstacles to the natural closure of the patent urachus. In the female it has been suggested\* that a condition of temporary incontinence of urine by over dilatation of the urethra might be likely to bring about what was desired. Though I am not aware that this practice has been successful, I think the suggestion a good one, and capable of being combined with one or other of the more direct means of bringing about a closure of the fistula to which reference has been made.

Dr. Reliquet,† of Paris, has recently published a case illustrating not only a remarkable deformity, but at the same time a variety of pathological lesions involving the urinary system. The specimen is one of hydro-nephrosis of the right kidney and ureter, with calculous pyelo-nephritis of the left organ, which is also very much hypertrophied. It will be observed from the illustration (Fig. 102) that two large ducts proceed from the degenerated right kidney to the bladder. The outer and larger one is the dilated ureter, whilst the inner tube proceeding from the apex of the kidney downwards is a patent Müller's duct. The latter structures it will be remembered are the origin of the Fallopian tubes, the uterus, and part of the vagina, and are generally supposed to be reduced to the verumontanum in the male, where any trace of their persistence is rare. In Dr. Reliquet's case the remarkable clinical symptoms were no doubt due to the compression of the right ureter against the back of the bladder by Müller's duct. When putrid urine had collected in the dilated right kidney and ureter, sufficient to overcome the resistance of Müller's duct (which was also distended with fluid),

\* Mr. F. Cadell, *Edin. Med. Journal*, Sep., 1878.

† "Persistance du Canal de Müller." *Publications du Progrès Médical*, Paris, 1887.

it escaped into the bladder, and was voided during micturition. The bladder orifices of both ureters were patulous, and reflux of

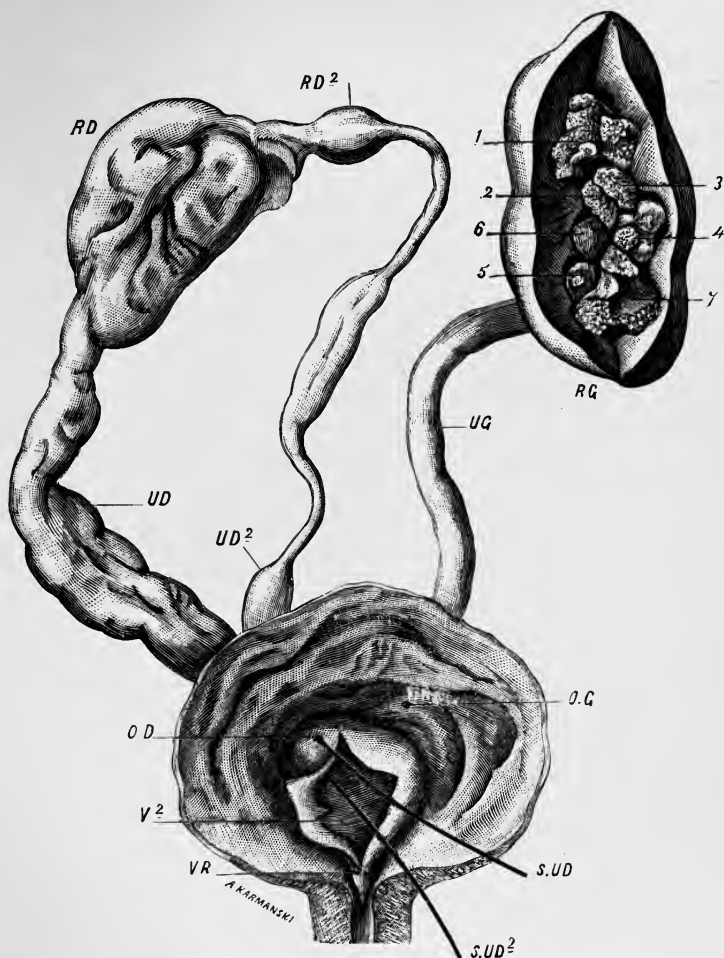


Fig. 102.\*

\* R. G. Left kidney, containing calculi, marked 1-7. U. G. Left ureter. O. G. Orifice of left ureter in the bladder. R. D. Right kidney. U. D. Right ureter. O. D. Orifice of right ureter in the bladder. R. D.<sup>2</sup>, U. D.<sup>2</sup>. Upper portion of Müller's canal. U. D.<sup>2</sup>, V.<sup>2</sup>. Lower portion of Müller's canal. V. R. Verumontanum. S. U. D. Bougie in right ureter. S. U. D.<sup>2</sup>. Bougie in lower portion of Müller's canal.

urine on the left side was no doubt the cause of the calculous pyelitis. The pressure of Müller's duct prevented this back flow of urine along the ureter on the right side, hence the different results observed in the two kidneys. The specimen was taken from a man forty-five years of age. That the persistence of Müller's ducts may prove a serious obstacle to the passage of urine into the bladder there can be no doubt from the evidence afforded in this, as well as in other cases; whilst, on the other hand, such an abnormality may exist without producing symptoms, as in Dr. Ord's illustration.\*

Amongst the most distressing deformities to which the human body is liable is that where the roof of the urethra is absent in conjunction with a fission and extroversion of the bladder. No more deplorable condition can be imagined, for not only does the individual, more frequently of the male kind, possess all the desire of the sex which he is unable to gratify, but, further, the function of micturition is carried on in such a way as to be a constant source of personal distress, as well as of annoyance to others. The appearance presented by the parts in the male is shown in the illustration (Fig. 103). Here not only are the parts fissured from the bladder downwards, including the symphysis pubis, but the bladder (*a*) presents an appearance like a fungating mass. The orifices of the ureter (*c*) can generally be distinctly made out by the urine dropping from them, whilst the fissured penis (*b*) projects at the base of the mass like a spout. The prostate is rudimentary. As I have already noticed in connection with the subject of prostatic hypertrophy, I can find no record of any male suffering from this deformity who appears to have developed a large prostate.

To remedy this distressing condition various means have been employed. Of these I would mention certain plastic operations, having for their object the closing in of the protruding bladder so as to form a receptacle for the urine and a

\* *British Medical Journal*, vol. ii, 1879, p. 697.

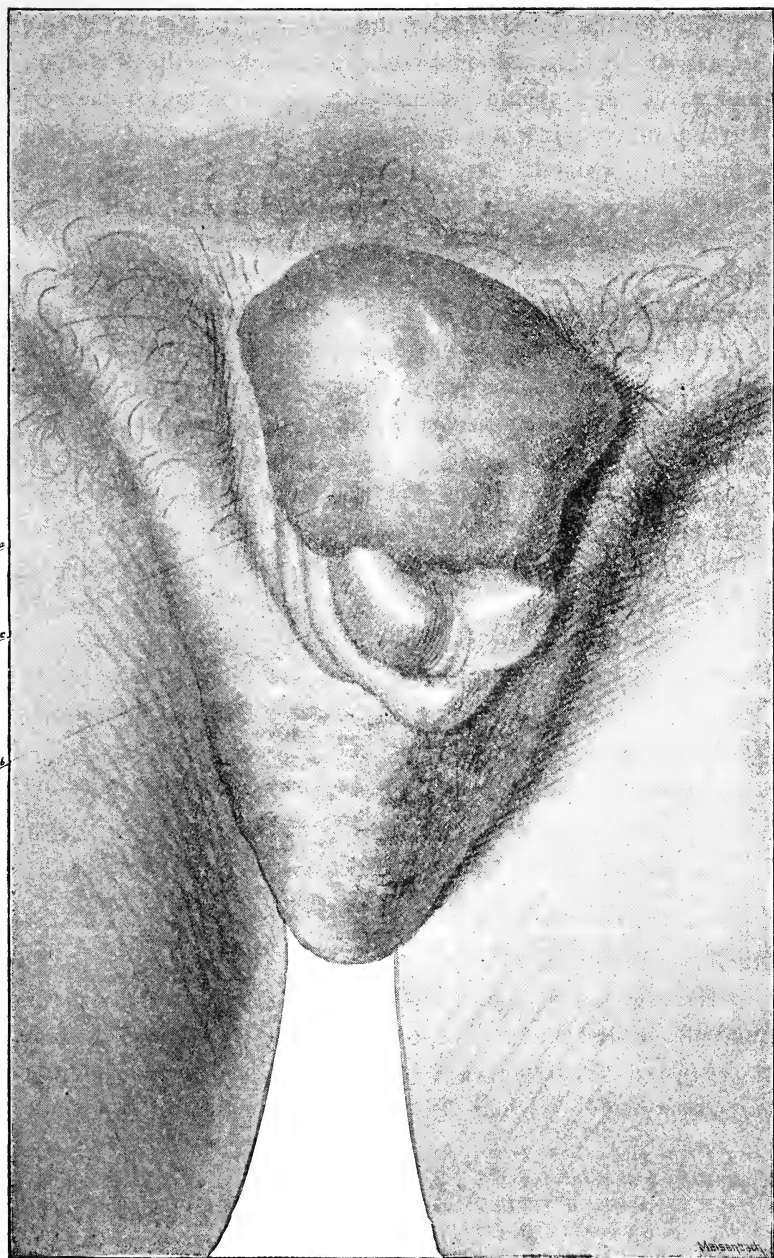


Fig. 103.

covering for the parts. To Mr. John Wood,\* of King's College, we are largely indebted for what has been done in this direction, and a reference should be made to his important papers by anyone undertaking an operation of this kind. Dr. Greig Smith,† of Bristol, has also recorded two cases where the operative procedure has been somewhat different, which may advantageously be referred to. Various plans have been suggested and tried, having for their object the diverting of the urine by a fistulous track into the rectum. I do not, however, know of any results thus obtained which would induce me to repeat these latter procedures. As bearing upon this mode of treating these deformities, I would mention a paper by Mr. Thomas Smith.‡

Of mechanical appliances for the relief of the condition in question, I can speak favourably of an apparatus made by Messrs Tiemann, of New York, which consists of a metallic or hard rubber shield for application over the extrophied bladder, to the lower extremity of which is attached an elastic tube, leading to a soft rubber pouch to collect the urine; this is buckled to the thigh or may be carried still further downwards (Fig 104).

A case of congenital absence of the bladder is recorded by Mr. Vost, who appends the following note :—"A cavity to hold the urine could readily be made by inverting a flap from the abdominal wall; but the absence of a sphincter would make the receptacle useless. All attempt at operative procedure was therefore abandoned."§

Hypospadias denotes a congenital deficiency of the lower wall of the urethra, and is of more common occurrence than epispadias. Its importance and the necessity for considering any treatment of it may be regarded as relative to its extent.

\* *Royal Med. Chir. Trans.*, vol. 52.

† *British Medical Journal*, Feb. 7, 1878.

‡ "An Account of an Unsuccessful Attempt to treat Extroversion of the Bladder by a New Operation."—*St. Bartholomew's Hospital Reports*, vol. xv.

§ *The Lancet*, August 14, 1875.

When the deformity is limited to the orifice of the urethra, there being an absence of the frœnum with a slit-like opening to represent the meatus, I am not aware that any inconvenience or imperfection is thereby caused. I am tolerably sure, however, that such persons are more liable to be inoculated with the gonorrhœal virus should they be brought in contact with it. I have also seen, on more than one occasion, an indurated chancre occupying this position.

Where the congenital opening is at the root of the penis, it

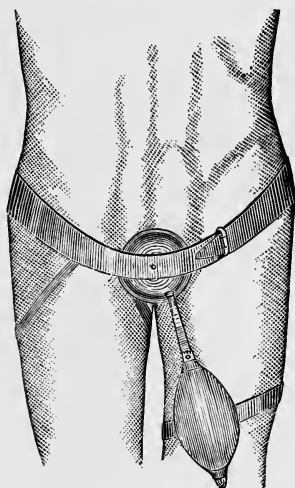


Fig. 104.

seems quite possible that the seminal fluid may entirely fail to enter the vagina during sexual intercourse, and thus the condition of the individual be assimilated with those where the deformity is artificially produced. It is stated in the *Australian Medical Gazette*\* that amongst the methods employed by some aborigines of Central Australia to prevent conception is that of opening the male urethra, and slitting it up towards the glans penis, immediately in front of the scrotum. In certain cases of urinary fistulæ with urethral stricture the semen is emitted

\* *Medical Press and Circular*, May 30, 1883.

through the false route. The following case illustrates some points in the operative treatment of hypospadias.

This was a case of atresia, or imperforation of the glans in a boy, the patency of the urethra being limited to a small opening in its lower wall, one inch and a half from its proper termination. He came to me for a difficulty in urinating, and as I thought it possible, in addition to this, that the use of the penis as an effective genital organ might be interfered with, I considered it proper to endeavour to restore the continuation of the channel. I succeeded in doing this by introducing a probe through the small urethral opening beneath the penis, into a cul-de-sac of the canal, and then making a passage with a tenotomy knife as nearly as possible in the right direction through the glans penis. This was subsequently kept open by the frequent passage of bougies. The boy micturated through the artificial urethra I had thus made for him, and the original opening on the under surface of the penis got still smaller. I was arranging to close this by a slight plastic operation, when the patient left the Infirmary, considering himself quite well. I have not seen him since, but I was so well satisfied with what had been done, that I should feel disposed to repeat the proceeding.

Where any attempt is to be made to restore the penile urethra arising out of a congenital deformity, such as a hypospadias or an epispadias, or as a consequence of some ulceration or laceration, I am satisfied from some experience of these operations that the first principle of treatment is the temporary deviation of the urine through the perinæum, until such time as the plastic operation has soundly healed. Unless an external perineal urethotomy for urine drainage precede such attempts to repair, disappointment is tolerably sure to follow. In some hypospadiacs there is a fission of the prepuce below and a great redundancy above, the part being disposed somewhat like a veil over the glans penis.

I saw a boy in 1883, aged two-and-a-half years, where this deformity existed. The prepuce was an ample fold of skin, almost square in shape, which could be folded over the glans and meatus just as I have said, like a veil. There were no symptoms of urinary

irritation, and I advised that the question of removing the redundant foreskin should be postponed.

The following case arising out of the same kind of deformity, but where the state of the foreskin was just the opposite and caused some tension on the part, has its point of interest as well as of practical value.

It was that of a young gentleman with a slight hypospadias. He had been married six months without signs of family, and was in doubt as to whether his malformation was in any way responsible for this. His grounds of complaint were (1), that the urine scattered, and was not projected in a stream; and (2), that intercourse was painful to him by the tightness of a fold of skin beneath his meatus, which proceeded on either side to form a very scant prepuce. As it seemed that this bridle might be a source of inconvenience I divided it with permanent advantage to the patient.

A contraction of the urinary meatus, whether congenital or acquired, as by the healing of an ulcer in this position, is sometimes a cause of much inconvenience. When persons so formed contract gonorrhœa I feel sure that the closed state of the orifice of the urethra often retards recovery by confining discharges within the canal and interfering with the natural drainage outwards of the urethral excretions. I have often known the removal of the contraction by its division or dilatation, preferably the former, speedily followed by the drying up of chronic discharges, which previously had resisted all kinds of treatment. Such a contraction is sometimes an annoyance to persons by confining urine within the canal, which by escaping after they have thought micturition to be completed, soils and wets their clothing.

Though I have not met with an instance in my own practice, I think it well to remind you of a deformity in the female, where the bladder becomes inverted, or turned inside out, and protrudes between the labia as a vascular mass (Fig. 105). I do so because in the case from which this illustration was

taken\* the patient narrowly escaped the application of a ligature to the protrusion on the supposition that it was a nævus or vascular growth. Fortunately Mr. Crosse was able to prevent the adoption of such a fatal course; for, as he remarks, "had a ligature been efficiently applied to the neck of the tumour, as was contemplated, the bladder would have been removed,

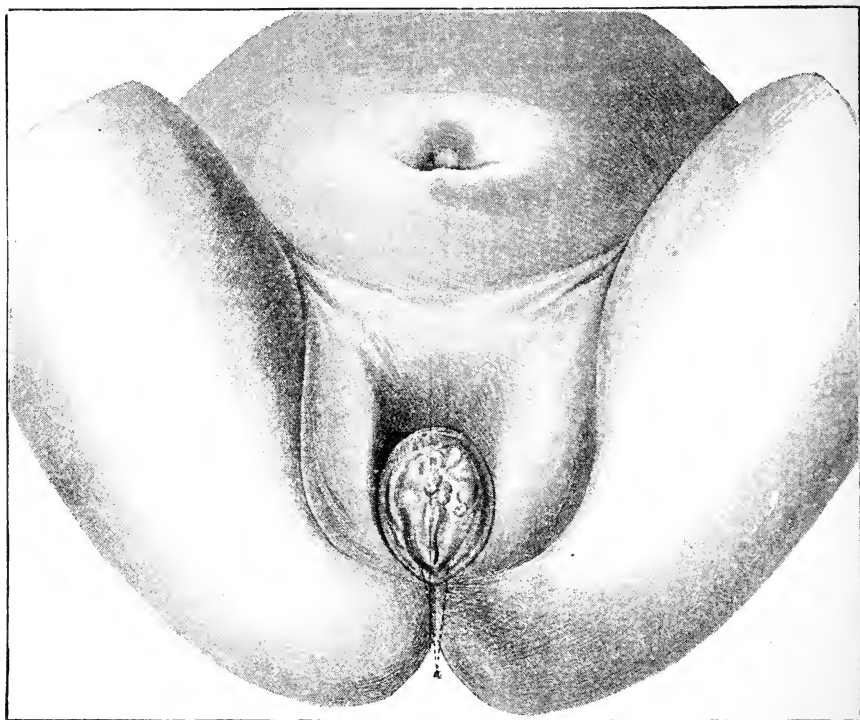


Fig. 105.

including all its coverings, the ureters cut through just above their terminating orifices, and the peritoneal cavity largely opened." On examining this tumour, it was found capable of being reduced like a hernia by the pressure of the finger.

\* "On the Inverted Displacement of the Urinary Bladder," by J. G. Crosse.—*Trans. Prov. Med. and Surg. Ass., New Series*, vol. ii.

When reduction was thus accomplished, a passage remained through which the tumour on retiring had taken its course, and which proved to be the dilated urethra. This reduction appears to have been effectual, for as it is remarked, "during the short time that the patient remained under my notice there was no relapse, and I am enabled to add that she is still living after an interval of sixteen years, and is a healthy young woman, save only the affliction of the incontinence of urine, with which she has been constantly troubled, but without any relapse of the vesical displacement." Mr. Crosse concludes his paper with the following passage bearing upon diagnosis, "protusions of the relaxed lining membrane of the bladder *into* and *even through* the urethra, and vascular growths taking the same course, are not very unfrequent, as every surgeon of experience knows, but these are very different from the inversion and prolapse of the entire bladder through the urethra in female children—a fact which, however rare, ought henceforth to be regarded as satisfactorily ascertained."

Cystocele, or hernia of the bladder is not very commonly met with. We should, however, be alive to the possibility of such a protrusion taking place and requiring surgical attention, otherwise we may find ourselves placed in somewhat awkward positions. Instances will be found recorded where the exploration of swellings and prominences in the region of the pubes, groins, and perinæum has proved them to be urine cavities, undoubtedly formed by hernial displacements of the bladder. The following case illustrates most of the practical points in the diagnosis and management of this class of abnormalities.

A single lady, aged about forty, was referred to me by Dr. Waters in 1883, suffering from a swelling in the right groin, for which an instrument maker had some time previously applied a truss. Though there was some swelling below Poupart's ligament, I could detect no proper impulse on coughing, nor did the tumour decrease on the patient's lying down. On exercising pressure over the swelling, pain was referred to the pudendum. She complained that the passing of

urine had not been so free or so comfortable as formerly. I passed a long catheter into the bladder, and having emptied it, the instrument could be pressed in up to the hilt. Then, on pressing over the tumour with the fingers, a considerable amount of urine could be made to flow. Pressure over the swelling after it had been emptied with the catheter certainly considerably diminished its bulk. The urine was neutral and contained phosphates. As there could be little doubt that the patient was suffering from a hernia of the bladder, she was ordered to wear an elastic spica bandage over the groin, which I heard gave permanent relief. The symptoms seemed to me to point to an actual hernia of the bladder rather than to a sacculation, though I could quite understand, from the examination of this as well as other cases, that it is not always easy to draw a distinction between these two conditions.

Vaginal cystoceles represent the most frequent form of the disorder; they most commonly occur in women who have borne many children.

The operation of circumcision, though not always undertaken for a deformed condition of the prepuce, may be briefly referred to. How it came to pass that circumcision should be decreed, which at first sight would seem to suggest an imperfection in creation, is a direction of enquiry foreign to my purpose; suffice it to remark that the removal of a portion of the foreskin appears to be a wise precaution against changes in the part, the result either of errors in development or of disease, which might interfere with comfort or health. From a clinical point of view, therefore, circumcision is rendered a necessary or an expedient operation.

It is to be recommended in all cases where the orifice of the prepuce is so contracted as not to permit of the glans penis being uncovered; in some persons the degree of contraction is so great as barely to permit the introduction of a fine probe. Here micturition is as much interfered with as if there were a stricture at the meatus of the urethra. The straining to urinate thus caused has undoubtedly led to the formation of a hernia in children. To remedy this it is the practice of some

surgeons to slit up the prepuce on a director. I do not think this is a good plan, as angles are left which sometimes prove very inconvenient. I have had to perform a modified circumcision to remove the annoyance caused by these angular projections of the slit-up foreskin. In addition to cases such as these, where removal of the contracted foreskin is a necessity, the operation is expedient where the prepuce fits the glans with some tightness or is unnaturally long or superabundant. In the former instance, not only is great inconvenience experienced, but the individual is exposed to the risk of his glans becoming strangulated by the retracted foreskin; this is technically spoken of as a paraphimosis. In the latter instance, the long prepuce, by retaining secretions, subjects the person to balanitis, herpes, and excoriations; further, a redundant foreskin furnishes a convenient receptacle for inoculable virus. Mr. Hutchinson has shown that the circumcised Jew is less liable to contract syphilis than the uncircumcised Gentile. "No one," he remarks, "who is acquainted with the effect of circumcision in rendering the delicate mucous membrane of the glans hard and skin-like will be at a loss for the explanation of this."\* And what is true of syphilis is equally so of other diseases capable of being spread by contagion or roused by irritation. It is rare to meet with cases of cancer of the penis in persons who have always lived with the glans uncovered. A foreskin may be so tight and contracted as very seriously to interfere with the development of the glans penis within it. I have met with two or three instances of this in children where I am sure circumcision was a necessity to permit of the proper growth of the glandular portion of the organ.

Further, circumcision is sometimes necessary for removing the cause of reflex irritation felt elsewhere. How frequently we find in children nocturnal incontinence of urine provoked by an elongated prepuce, and cured by its removal. Professor Sayre has pointed out how such an abnormal condition of the

\* *Medical Times and Gazette*, Dec. 1, 1855.

foreskin is the cause of various reflex pains, which have, in the absence of the proper explanation, been regarded as indicative of hip-joint disease. I have seen him demonstrate the truth of this, and cure the apparently anomalous pains by removing a contracted prepuce. Under these circumstances, then, the operation of circumcision is to be recommended. Dilatation of the prepuce is occasionally recommended where the patient is strumous, or is a "bleeder," and it is desirable to avoid making an incision. Various instruments have been devised for this purpose; of these the one described by Mr. R. W. Parker will be found convenient.\*

It has happened to me to treat two varieties of stricture of the urethra which have resulted from circumcisions which have not turned out well, and as they indicate the necessity of certain precautions being taken to prevent such inconveniences following, I allude to them here. In two instances, the extremity of the glans penis, including the meatus, was wounded in making the section of the prepuce. In one the division had been made without the use of forceps, or other similar contrivance to include the foreskin, and secure retraction of the glans behind the line of section, the operator contenting himself with merely holding the portion to be removed between the finger and thumb, and then making the amputation. This is obviously a hazardous mode of proceeding. In the other case, where the glans had been wounded, there appears to have been considerable œdema of the prepuce, and consequently difficulty, in its swollen condition, of determining the precise position of the glans within it. Amputation of the prepuce had been performed, and the end of the glans included. Under such circumstances it is better first to slit up the prepuce with a probe-pointed bistoury, and, after having exposed the glans, to complete circumcision with a pair of scissors.

The second variety of stricture was caused by the prepuce

\* *British Medical Journal*, July 19, 1879.

being divided too high up, or what amounts to the same thing, being drawn down too much over the glans penis before being included in the forceps for the purpose of making the necessary section. On bringing together the parts with sutures, the tension on them was so great as to cause ulceration, and to leave behind a broad cicatrix capable of exercising a contractile pressure on the under surface of the urethra, sufficient to impede micturition, and to cause other discomfort. In circumcising a patient, remember to break down all adhesions between the glans and the prepuce. They are generally caused by attacks of balanitis, and sometimes are so firm that force has to be exercised to effect a separation. This, however, must be done.

In some cases of suspected ulceration of the glans penis, where retraction cannot be practiced, it is a safe proceeding either to circumcise or slit up the prepuce, for the purpose of ascertaining the nature and extent of the diseased action; the doing of this sometimes reveals a state of ulceration which was hardly to be expected. The only objection that can be raised against the practice is, that in recent cases of syphilis the newly cut surfaces may become inoculated with the virus; this, however, is as nothing compared with the damage by ulceration which may be going on. So long as you have the sores open before you, their extent matters but little.

The state of the frænum also requires consideration. Where it is not too tight it is better not to divide it, as after circumcision it is generally found to adapt itself to the altered relation of the parts. When, in the flaccid condition of the penis, it is so tense as to be on the stretch, or to depress the extremity of the organ, it is, in the adult, always well to divide it, otherwise the patient incurs a risk of rupturing it. On dividing it, a small artery usually spouts freely, and requires either twisting or a ligature. I have known in an anæmic young man serious hæmorrhage from rupture of the frænum. In this case several hours elapsed between the accident and my

seeing the patient, who was found in a state of collapse, with his bed and clothing saturated with blood. He remained in an alarming condition for some days, but eventually made a good recovery. Just a word about division of the remains of the frænum when it is undermined by chancroid ulceration, and a bridge of tissue alone is left. To snip it across with a pair of scissors saves a few days of ulceration; but this slight operation necessitates some bleeding if the artery is not obliterated by adhesive inflammation. As this is a small operation, often done in the consulting room, it is desirable to avoid soiling the patient's linen with blood. This is easily avoided. Take a finely-pointed piece of wood, and dip it slightly in nitric acid, and just touch the frænum on its cuticular aspect, at the site of proposed division, until it is blanched all round; then snip it across with your scissors, which you can do without hæmorrhage. By this means the bridle is divided in the course of a minute or so, without bleeding, or even pain, if a solution of cocaine is previously used.

An unnatural smallness of the orifice of the urethra is a not infrequent cause of incontinence of urine in children. I have seen not only micturition in this way impeded in a young child, but considerable irritability caused, both of which inconveniences have been removed by division of the meatus.

## FORTY-FOURTH LECTURE.

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### THE PATHOLOGY OF TUMOURS OF THE BLADDER AND PROSTATE.

BEFORE proceeding to consider the operative treatment of tumours of the bladder and prostate, a brief account will be given of their pathology. In the preparation of these remarks, I would take the opportunity of expressing my obligations to Dr. Alexander Barron for the valuable assistance he has here rendered me, and to Mr. Paul for the excellent display of microscopical specimens used for illustrating these observations. The most characteristic of these specimens I have had copied for future reference in connection with these remarks.

Tumours of the bladder. The bladder-wall is developed partly from hypoblast and partly from mesoblast, consequently, on the embryological theory of the origin of morbid growths, we may expect to find connective tissue, vascular, and epithelial tumours. It is interesting to note in association with papilloma of the bladder that the allantois, the hypoblast lining of which gives rise to the epithelial coating of the bladder, is also the source of the chorionic villi, the most perfect example of physiological papillary growths. The classification of bladder and prostate tumours adopted here is practically identical with that proposed by Mr. F. T. Paul,\* in a paper read before the British Medical Association in 1883. The former will first be considered in the following order:—(1), Myoma; (2), Fibroma; (3), Myxoma; (4), Sarcoma; (5), Papilloma; (6), Carcinoma.

1. Myoma of the bladder is a very rare growth, met with

\* *British Medical Journal*, January 4, 1884.

chiefly in the form of nodules encapsuled in the submucosa. It is composed of unstriped muscular fibres, resembling uterine or prostatic myoma (see Fig. 109). Cases are recorded by Gussenbauer\* and Volkmann.†

2. Fibroma, and 3, Myxoma, may be regarded as essentially the same, myxoma being merely a fibroma, the cell substance of which has undergone mucoid transformation. The great majority of these growths, which are by no means common, are polypoid, and the softer varieties approach very closely in structure to that of the denser papillary growths. A true fibroma, however, would originate in the deeper layers of the submucosa or muscular coat, and would be covered by the distended but otherwise normal epithelial layer; whereas, in a papilloma, the essentially epithelial character of the growth is evident (Fig. 107) from the large share taken by the epithelium in its formation. Fibroma and Myxoma constitute the majority of so-called bladder polypi.

4. Sarcoma of the bladder is a very rare growth. Mr. Paul, in the paper before quoted, mentions but one specimen, the same described by Mr. Roger Williams.‡ This growth occurred in a hernial sacculus of the bladder, and was composed of round and spindle cells. It was believed to be a sarcoma which had inflamed. Two cases of lympho-sarcoma of the bladder have been described by Mr. Eve and Mr. Chaffey, § and the former also, in the same communication, gives an account of a mixed or myo-sarcoma occurring in the muscular coat of the bladder. The lympho-sarcoma is composed of a fine fibrous stroma, the meshes of which are occupied by round cells with large deeply staining nuclei and very scanty cell protoplasm. Sarcomas of the bladder may be very small, scarcely shewing on the surface, or, as in Mr. Eve's case, they may form large masses projecting into and partly filling the

\* *Archiv. für Klin. Chirurg.*, xviii. † *Ibid.*, xix.

‡ *Path. Soc. Trans.*, vol. xxxiv, p. 152.

§ *Path. Soc. Trans.*, vol. xxxvi, pp. 284 and 287

bladder; the surface may be ulcerated, but is apparently, unlike carcinoma, never villous.

5. Papilloma. As the mucous membrane of the bladder is destitute of papillæ, the term papilloma, as applied to innocent villous growths of this viscus, has been objected to, many pathologists holding with Virchow \* that they should be termed vascular papillomatous fibroma. As the papillary outgrowths are, however, clothed by a very thick layer of epithelium, and, as it can be seen, as was first pointed out by Rindfleisch,† that in the more delicate of the villous tufts the basement membrane of the epithelium rests on the wall of the bloodvessel without the intervention of any fibrous tissue; it may be said that, although many villous tumours partake to a greater or less extent of the characters of a papillation of a fibrous growth, they are mostly best described as true papilloma, and in this connection it is well to recollect, as already mentioned, that the extra abdominal portion of the allantois which forms the chorion is normally provided with papillæ, hence it is not an unlikely occurrence for them to be met with in the bladder (the intra-abdominal portion of the allantois) as a pathological occurrence.

Papilloma or villous tumour (sometimes incorrectly called villous cancer of the bladder, is met with chiefly on the trigone and in the neighbourhood of the ureters, in other words, like warty growths in other situations, around the orifices. It is composed of numerous long, filamentous, branching processes, forming a cauliflower-like growth of a variable consistency depending on the amount of connective tissue framework supporting the epithelial growth and vessels. On microscopic examination the processes are seen (Figs. 106 and 107) to be made up of more or less of a delicate stroma, containing thin walled and wide—sometimes varicose—bloodvessels, the whole forming an upward prolongation of the submucosa, covered with stratified

\* *Die Krankhaften Geschwulste*, Bd. iii, Berlin, 1865.

† *Pathol. Histol. Eng. Trans.*, vol. i, p. 454, e. 1872.



Fig. 106.

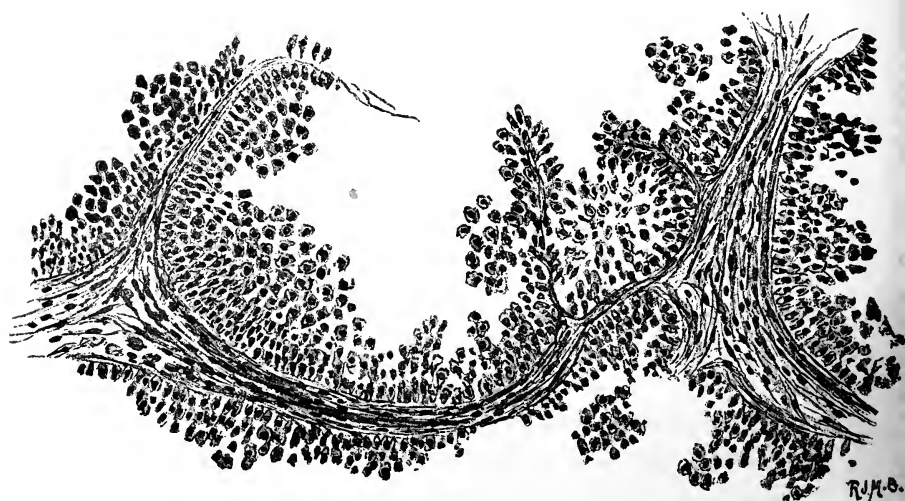


Fig. 107.

epithelium. The growth does not extend into the deeper layers of the mucous membrane, and the epithelium everywhere rests on a basement membrane. While the growth retains this structure it is in no sense malignant or cancerous, but papilloma here as elsewhere is liable, if not removed, or if recurring after removal, to grow more and more dense and fleshy in character, and ultimately to become a carcinoma. This is well illustrated in a case related by Mr. Paul, where a papilloma which had been removed several times ultimately destroyed the patient after ten years of occasional treatment, and the growth was then found to be infiltrating the bladder wall as a carcinoma. It is to be remembered that where a papilloma overlies a carcinomatous growth in the submucous and muscular coats of the bladder, this condition does not necessarily depend on the innocent growth having taken on malignant characters, since it is not very rare to find, as is well shewn by Cornil and Reliquet,\* that carcinoma may be associated with the development on the overlying surface of a structurally innocent papilloma (see Fig. 114).

The delicate and friable character of villous tumour renders it very liable to injury from the contraction of the bladder in emptying itself, not only by the action of friction and pressure on the growth, but also by the congestion of the capillary loops produced by the contraction of the muscular coat. In this way hæmorrhages are frequent, and death is usually due to anæmia and exhaustion. In other cases the position of the growths around the ureter leads to chronic obstruction of that tube and hydronephrosis. In some instances where the obstruction is more acute, suppurative pyelonephritis may result.

6. Carcinoma. The epithelial lining of the bladder is composed of a single surface layer of large-sized squamous cells, with underlying pear-shaped and round cell layers. It is also provided with small racemose mucous glands, most

\* *Carcinome Villeux Diffus de la Vessie*, par MM. Cornil and Reliquet, Paris, 1886.

numerous near the neck of the bladder. It will be seen that we may thus expect to meet with two varieties of cancer of the bladder (a), epithelioma, or squamous-celled carcinoma (Fig. 108); and (b), glandular-celled carcinoma. Speaking clinically,

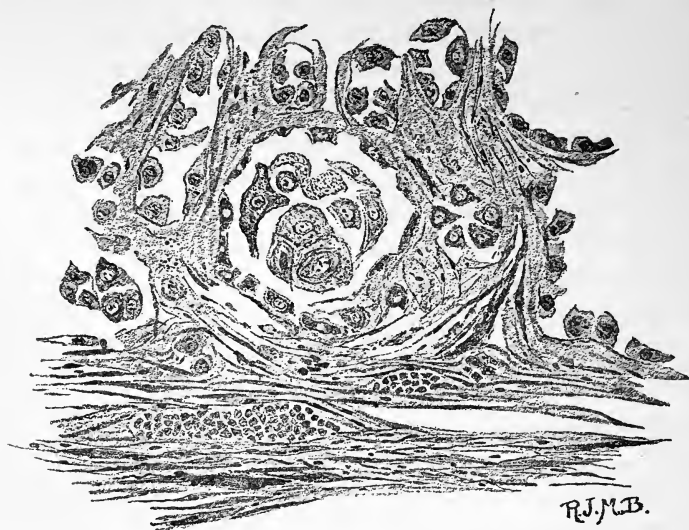


Fig. 108.

the former would usually be termed encephaloid cancer, whilst the latter might be encephaloid or scirrhus, in other words, hard or soft. These clinical terms, however, give no information relative to the intimate structure of the tumour, but indicate only its rapidity of growth and probable degree of malignancy. The vesical glands might be liable to innocent adenoma as well as to malignant carcinoma. So far as I know only one case of the former is recorded, viz., a case of papillary adenoma. removed by Kalténbach\* from the bladder of a woman aged 44 years.

Dr. J. H. Neale, of Leicester, records a case† of malignant tumour of the bladder where the account of the microscopical

\* Kalténbach, *Langenbeck's Archiv.*, xxx, 1884.

† *British Medical Journal*, May 21, 1887.

features of the growths, to which he gives the name of adeno-encephaloid cancer, indicates a glandular as distinct from a squamous epithelial origin for the growth. The ordinary epithelioma of the bladder is a growth of variable size and extent, either limited to one spot from which it spreads or diffuse, occurring in a variable number of patches, one usually shewing evidence of being the primary growth. The tumour is not encapsuled, but infiltrates the submucosa and muscular layers spreading to the peritoneum, the bowel, the prostate, or even extending to the perinæum, where it forms a fungating mass. This latter is liable to occur in cases where the growth has been partially removed from the bladder after perineal section; the cancer invading the granulation tissue of the wound, and spreading along it to the surface.

The mucous membrane over the growth may be ulcerated and fungous, or covered with papillary growths,\* showing no outward evidence of malignancy, or even quite smooth and apparently unaltered, in the smaller patches. The stroma of the growth, composed of the tissue of the submucous and muscular layers, with more or less round cell infiltration, is full of alveoli well packed with epithelial cells, following, with more or less accuracy, the types of the bladder epithelium. The formation of "cell nests" varies much in different specimens and even in different parts of the same specimen. Colloid degeneration may occur in primary carcinoma of the bladder, but is by no means common.

Secondary Carcinoma: Secondary cancer of the bladder is much more common than primary cancer. It is usually due to direct invasion of the bladder walls by growths originating in the rectum or the uterus. In either case the growth infiltrates the bladder wall and may cause symptoms such as vesical tenesmus and hæmaturia, or it may interfere with the flow of urine into or from the bladder, with corresponding symptoms. Indications of the previous existence of the primary growths

\* Cornil and Reliquet: *Ut Cit.* See fig. 114 and text.

are not, as a rule, wanting. The structure of the secondary growth is, of course, a repetition of that of the primary one.

**Enchondroma:** Two cases of enchondroma of the bladder have been described,\* but in neither case does the description render it other than doubtful that the growths had their origin in that viscus. A case of vesical angioma is described by Langhans.†

**Cysts of the bladder:** Serous, hydatid,‡ and dermoid cysts of the bladder are occasionally met with. Serous cysts may be due to softening of a myoma or they may be simply cysts formed in the mucous membrane. Hydatid cysts may occur in the bladder wall or its immediate neighbourhood as elsewhere. Cases are from time to time recorded where hairs have been passed in the urine. In some cases the hair doubtless came from dermoid cysts of the ovary which had ruptured into the bladder, but in others they have unquestionably originated in true vesical dermoid cysts, or, as in Martini's§ case, from a patch of true skin bearing hair follicles and forming part of the bladder wall. Such an occurrence would depend upon a developmental aberration, by which a portion of the bladder wall had been formed by the ingrowth of epiblast to make up for some deficiency in the hypoblast.

Bilobed and pouched bladders|| and hernial saccular protrusions of the mucosa need only be named here. Cysts of the urachus are not very infrequent.

The presence of the *Bilharzia hæmatobia* sometimes leads to the formation within the bladder of fungating masses of exudation tissue, attended with profuse hæmaturia, which have called for operative procedures for their relief. These have been referred to in a previous lecture in connection with the disease generally which is due to this parasite.

\* *Gazette Medicale de Paris*, 1836. *Trans. Societe Anatomique*, 1861, p. 191.

† *Virchow's Archives*, vol. lxxxvi.

‡ *Fenwick, Path. Soc. Trans.*, xxxvii.

§ *Martini, Ueber Trichiasis Vesicæ, Langenbeck's Archiv.*, xvii, 1874.

|| *Path. Soc. Trans.*, xxxvi, p. 283.

Tumours of the prostate : As the prostate is composed of fibrous, muscular (unstriated), and epithelium-lined gland tissue, we may expect to meet with connective tissue tumours, myoma, adenoma, and carcinoma, and these we find to be the new growths of this part.

Myoma. Unstriated muscular tumours of the prostate are met with as small encapsuled growths, most frequent in the so-called middle lobe, or as large masses apparently involving the whole part. Such a case was Mr. Spanton's,\* where a mass of growth the size of a fist was removed by operation, and a further equally large mass was found at the autopsy. The structure of this particular tumour is well represented by Fig. 109. It closely resembles that of a moderately soft uterine

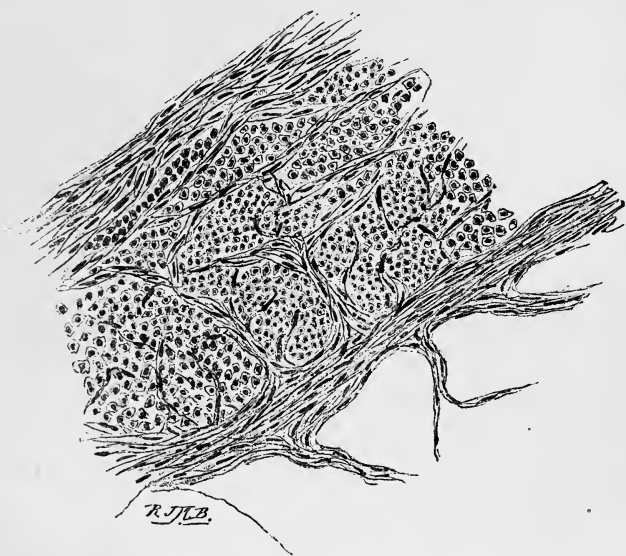


Fig. 109.

myoma, and in this connection the developmental identity of the female uterus, and male sinus pocularis, with its immediately surrounding muscular fibre is to be noted.

\* *Lancet*, vol. i, 1882, p. 1032 : also F. T. Paul, *Lancet*, January, 1883.

Sarcoma of the prostate would appear to be the form of new growth most frequently met with in this part. In structure it may be round or spindle celled, or, as is frequently the case in the bladder, a lympho-sarcoma. The specimen, a section of which is represented in Fig. 110, was a beautiful example of



Fig. 110.

large-celled spindle-cell sarcoma occurring in a man aged fifty-eight, with secondary deposits having the same structure in the lumbar glands and in the lungs. The case is one of those reported on by Mr. Paul in the paper quoted.

Carcinoma of the prostate is either tubular or acinous, and, in either case, may become colloid. Figs. 111 and 112 represent two specimens of this growth, and in some parts of the latter the colloid change was just beginning. The sections shew a stroma composed mainly of unstriated muscular fibre, containing alveoli filled with cells resembling those of the prostatic glands.

Primary carcinoma of the prostate is not of such rare



R. J. M. B.

Fig. 111.



R. J. M. B.

Fig. 112.

N N

occurrence as is generally supposed. It is frequently overlooked, both during life and after death, any enlargement or induration being regarded as merely ordinary hypertrophy. In several instances I have seen, where the diagnosis was verified by skilled microscopical examination, the disease was marked by slow progress, and the slightness of the local symptoms that were present throughout. It appeared to prove fatal by the general decay that was induced, rather than by any interference it occasioned, directly or indirectly, with the function of micturition. In this respect, this condition stands out in strong contrast with advancing forms of prostatic hypertrophy, as well as with other growths connected with this part. The following case seems to illustrate what I have just said :—

I saw a gentleman in 1884, whom I had an opportunity of watching for nearly two years, up to within a fortnight of his death. He was 59 years of age, and suffered in the first instance from some irritability of the bladder, which he could not completely empty. He was losing flesh, becoming pale, and, though the mental faculties remained vigorous to the last, he constantly complained of pain in the loins, nates, and thighs. His urine frequently contained more flocculent mucus than normal, but in other respects was healthy. In the course of a few weeks after I first saw him, he became entirely dependent upon the catheter, the use of which caused him no inconvenience, and completely relieved him so far as his bladder was concerned. Still he went on steadily wasting and complaining, in spite of most nutritious food, which he could take freely, and morphia. I examined his prostate on several occasions, and it was as hard as a stone, nodular, and almost insensitive to the touch. As his general health declined, minute patechial spots appeared on various parts of his body, and his feebleness gradually increased. His prostate, if anything, enlarged, but slowly, though no glands in the neighbourhood were involved. Occasionally he passed a small quantity of blood with his urine. Shortly before his death I discontinued my attendance. He appeared to die of exhaustion, the result of a prolonged blood vitiation. After death his prostate was removed, and given to Mr. Paul for examination, who reported it to

be an unmistakable example of *carcinoma*. There was no evidence to show that this was other than the primary disease.

I have seen many instances of a precisely similar kind, where a carcinomatous prostate and a state of gradually failing health, with blood deterioration, were at all events coincident, whatever pathological relation the one held to the other. Still more recently, I have a similar case under observation with my friend, Dr. A. C. E. Harris, of Birkenhead, where the state of the prostate and the condition of the general health are, so far as we can discover, precisely analogous. These cases, as I have said before, are usually regarded in the light of ordinary prostatic hypertrophies, in spite of the important distinction which closer examination will render apparent.

The prostate is frequently the seat of small calcareous deposits, which have been described under the name of prostatic calculi. They probably represent a concreted state of the natural secretion of the prostatic glands.

Tubercle of the prostate, which is first miliary and then caseous, may be mistaken for new growth if care be not taken to exclude it on clinical grounds. It is, as a rule, secondary to tubercle of the kidney and bladder, or of the testicle, most frequently the latter. Prostatic cysts may be either retention cysts of the prostatic follicles, or, what is more usual, urethral diverticula, such as one recorded by Mr. W. Arbuthnot Lane.\*

\* *Path. Soc. Trans.*, xxxvi, p. 288.

## FORTY-FIFTH LECTURE.

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### THE TREATMENT OF TUMOURS OF THE BLADDER AND PRO- STATE—ACUTE SLOUGHING OF THE BLADDER IN CONNECTION WITH DISEASES OF THE SPINAL CORD.

FOR clinical purposes, including treatment, it will be convenient to consider tumours of the bladder in the way they usually present themselves to our notice. It will not be necessary to have a very large experience of these growths to recognise three stages or periods in the existence of many of them which, though not defined by any arbitrary or artificial lines, are sufficiently distinctive for the object in view. These three stages may be defined as:—(1), *Quiescent*; (2), *Symptomatic*; (3), *Destructive*. It will be at once recognised that it would be impossible here to disconnect symptoms and treatment; one is the outcome of the other, and the former may be regarded as determining the latter. I must, however, not be understood as implying that all tumours of the bladder pursue such a course as I have thus endeavoured to indicate by a classification. Some growths are, so far as we know, quiescent throughout, being only, as it were, accidentally discovered either during life or *post-mortem*; others tend to death by the nature of the symptoms they produce rather than by any destructive qualification they inherently possess and are capable of communicating; whilst a third group, like other cancerous affections, are fatal mainly by the tissue destruction they directly or indirectly effect, and the consequences arising out of it. With this reservation the classification I have suggested, for purely clinical purposes, may here be found convenient.

1. *The Quiescent Stage.* All tumours of the bladder may be said to have an initiatory condition, just as they have in other parts of the body, where by the eye or the touch the patient is conscious of them long before they give any other indications of their presence; and in this condition there can be no doubt some tumours of the bladder have remained during the whole period of their existence. The mere subjective evidence that a person has a tumour in this position would not, I submit, warrant the adoption of any operative measures to effect its removal, even if in addition it were possible to demonstrate its existence by other means than digital exploration. Some tumours of the bladder which have been found in the *post-mortem* room appear to have had no history connected with them; and instances are known in patients of the total disappearance after varying intervals of symptoms which were unmistakeably those of villous growth or papilloma. Of the latter I am acquainted with more than one case. How these growths may thus disappear, or become arrested in their progress, whether it is by an accidental self-strangulation, or by an inflammatory act, it is impossible to say; but that they sometimes spontaneously cease to trouble, I have not the least doubt.

2. *The Symptomatic Stage.* By far the larger proportion of bladder tumours sooner or later pass out of the condition where, even if their presence could be demonstrated, operative interference is not to be recommended, and enter upon what I have taken as the second or more active stage of their existence. Whether this transition is slow or rapid, gradual or sudden, much depends on their kind as well as what I would speak of as the accidents and contingencies connected with their growth, but whether innocent or malignant, primary or secondary, the great majority of them sooner or later make it apparent that life will eventually be destroyed, either by persistent hæmorrhage or ulceration, or by the degree micturition is interfered with. Hæmorrhage from the bladder, continuous or intermittent,

ulceration and the involving of neighbouring parts, and interference with micturition are the cardinal symptoms of tumour of the bladder, any one of which may be sufficient in itself to demand operative interference on the part of the surgeon. In addition to these indications which, in varying degrees, are invariably associated with the active stage of all these tumours, irrespective of their nature, valuable assistance in diagnosis can generally be obtained by other means—these may be enumerated as, by examination of the bladder from the rectum; with the sound; and by the positive evidence that may be furnished by the tumour itself.

Examination of the rectum with the finger will frequently furnish conclusive evidence that the posterior wall of the bladder, as well as the contiguous portion of the bowel or prostate, is implicated in a growth of an irregular form and uneven consistence, which, in these respects, partakes of the characteristics usually associated with the physical signs of malignancy. Examination of the interior with the sound will often also unmistakably show that the cavity of the bladder is more or less encroached upon by new tissue formation, which, as a rule, readily bleeds, even under the most delicate manipulation.

In the last place, direct evidence is often afforded by the microscopical examination of portions of the growth which may be voluntarily discharged by micturition, or which may be accidentally or designedly removed in the eye of a catheter or by other instrument used for the examination of the interior of the bladder. And this leads me to point out the great importance of this method of investigation. Not only may most conclusive evidence be thus afforded of the precise nature of the tumour, but the patient's prospects relatively to operation and its results be largely determined. Over and over again have I seen and verified the truth of this and recognised this important application of histology to practical surgery. The diagnosis of tumour and its probable nature, together with the persistence of

the symptoms in varying degrees to which I have referred as being the cardinal indications of tumour of the bladder, would warrant us in proceeding to the preliminary stage of operative procedure: I refer to the exploration of the interior bladder with the finger.

Digital exploration of the bladder relative to the treatment of tumours seems to me to be called for when it can fulfil at least three objects—(1), the relief of symptoms which are otherwise irremediable; (2), for verifying the diagnosis of tumour; (3), for determining whether the removal of the growth can be proceeded with. The circumstances which require a surgeon to

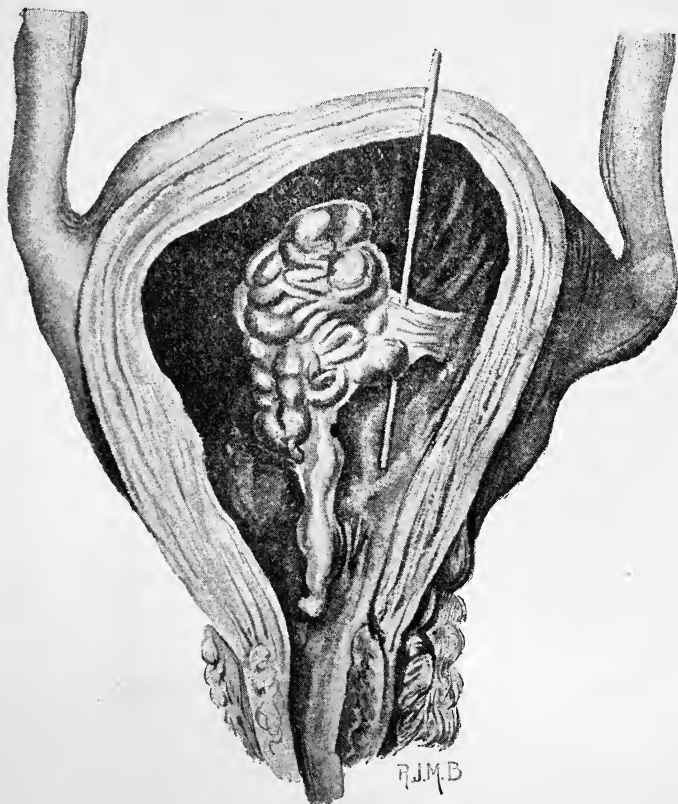


Fig. 113.

open the bladder for the purpose of finding out what is inside it must be very exceptional, but when, by this proceeding, the three important objects I have mentioned are to be obtained with little risk, then its importance cannot well be over-rated.

In the two drawings will be seen examples of very opposite conditions, one where everything may be hoped for from operation, where complete and permanent recovery modern surgery has proved to be possible; and the other where nothing is to be expected except the relief of those symptoms of urgency which render an opening into the bladder necessary. The first

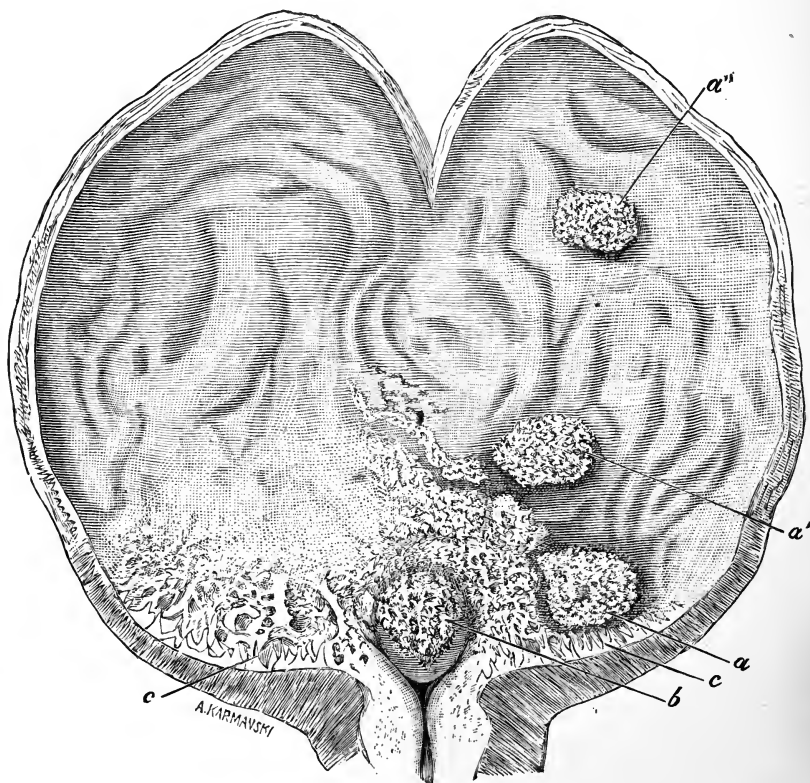


Fig. 114.

drawing (Fig. 113) \* represents a fibrous papilloma of three and a half years duration with a narrow pedicle, and the second (Fig. 114) † a villous carcinoma of extensive connections.

In the latter case, to attempt extirpation of the growth is obviously out of the question; to explore it with the finger, and to feel so far satisfied, and, at the same time, to give the patient an opportunity of emptying his bladder completely by means of a short and open road so long as he lives, is legitimate; nay, further, experience has already sufficiently shown that there is no better way of controlling the considerable bleeding which nearly always attends these cases than by providing the means of permanently maintaining the bladder in a condition of more or less contraction.

And now a few words in reference to the operation for exploring the bladder with the finger. If there are two ways to a place of about the same length but with somewhat different surroundings, you may depend upon it you will have two sets of travellers with the same aims, but with very opposite notions as to the respective merits of the two routes—so with the bladder; though we are agreed as to the necessity of exploring it, we are not so unanimous about the route. In this country, as well as in America, median perineal urethrotomy appears to be preferred; whilst in France, the claims of the supra-pubic operation have been forcibly urged by Professor Guyon, Pousson, and others. Sir Henry Thompson has advocated the former method, not only as being the safest and most convenient for exploration, but, as he has shewn by examples, for extirpating these growths. It seems to me that this form of procedure is to be preferred on several grounds.

In the first place, it provides a direct access to the more usual position of these growths; by a continuance of the incision forwards into the membranous urethra and backwards

\* *Clinical Lectures*, by Richard Quain, F.R.S., plate xxiv.

† *Carcinome Villeux diffus de la Vessie*, par MM. Cornil and Reliquet, Paris, 1886.

to the extreme limits of the prostate, it affords more room for manipulation than at first sight appears; but what is of more importance, it is, I believe, the best position for the drainage to follow, which is a most important item in the management of these cases. If a perineal exploration shews the position or character of the tumour to be such as would be benefited by an access from the front, should it be determined to remove it, there is nothing to prevent the addition of the supra-pubic incision, as Billroth first demonstrated. A supra-pubic incision is none the worse for having a more dependent opening, as Frère Côme practised, as already stated, in connection with his success as an operator for stone. But, as I have intimated, the great importance of the after-treatment, in relation to thorough drainage, renders to my mind the perineal procedure almost a necessity.

In connection with this point, it must not be forgotten what are the conditions under which these operations are often undertaken. In addition to the tumour which it is purposed to remove, there are usually present, either in the bladder itself, or in the organs associated with it, pathological changes which add considerably to the danger arising from the retention of anything which ought to escape. The viscus is occasionally sacculated, the ureters are patent and frequently largely distended, whilst the kidneys are rarely sound where the obstruction caused by the growths has been of long continuance. Hence we have much to fear from any extension of a suppurative process after the operation, as I have seen in two instances which have recently come under notice. One of the best safeguards against a contingency such as this is thorough drainage, and this I think can best be secured through an opening in the perinæum. Amongst the cases published illustrating the advantage of a perineal incision for exploration and drainage, and a supra-pubic one to facilitate the removal of the growths, I would refer to one by Mr. F. A. Southam,\* in

\* *British Medical Journal*, October 18, 1886.

connection with these points. Here, though the urethra was first opened, there was no difficulty in keeping the bladder distended with ten ounces of fluid whilst the supra-pubic incision was being made. Mr. Buckston Browne also reports\* a successful case of fibro-papilloma operated on by the double incision. When the bladder is opened in this way, it will be found convenient to secure the incision into the viscus above the pubes by the introduction of a silk ligature into each side of the wound. This materially assists subsequent manipulations. Mr. Whitehead and Dr. Pollard further point out † that the supra-pubic incision may be advantageously resorted to when a great depth of perinæum, enlargement of the prostate, or narrowing of the pelvic outlet, are likely to interfere with complete exploration of the bladder from the perinæum.

The feasibility of attempting to remove the tumour having been determined by digital exploration, the precise means of doing so has now to be considered. It will not be necessary for me to describe at length how this has been effected after an opening has first been made into the bladder by central perineal urethrotomy: in some instances the finger nail has sufficed; in others, various kinds of forceps, such as those employed by Sir Henry Thompson.‡ Mr. Pitts has recorded § a case where a growth was successfully removed by the *écraseur*. In examining two cases which terminated fatally, it appeared to me that if it had been possible to have applied a ligature round the pedicles, and then to have removed the growths cleanly, either with forceps or scissors, a different result might have followed. The nearest approach to such a proceeding seems to be one recorded by Mr. Henry Morris,|| who, failing on the first attempt to remove a growth in consequence of the want of the most

\* *British Medical Journal*, Jan. 29, 1887.

† *The Surgical Treatment of Tumours of the Bladder*, p. 9.

‡ *On Tumours of the Bladder: their Nature, Symptoms, and Surgical Treatment*.

§ *Clinical Society*, May, 1885.

|| *The Lancet*, April 21, 1884.

appropriate means for extraction, the patient was left for two days, when the tumour was found prolapsed into the wound. Having stretched the edges of the wound apart by retractors, he succeeded in placing a ligature of catgut over the base of the growth and removing it with scissors. The patient made a good recovery.

When, after the bladder has been opened and explored, it seems practicable to remove the tumour, this should be effected as completely as possible; to take away a portion of it is to leave the remainder to inflame, suppurate, and possibly to become gangrenous, thus providing a fruitful cause for pyelitis, through the largely dilated ureters. Not being entirely satisfied with the forceps that hitherto have been used for the purpose of seizing and extracting these growths, I have had some others made for me (Fig. 115) which, so far as I have been able to judge of them in practice, are well adapted for

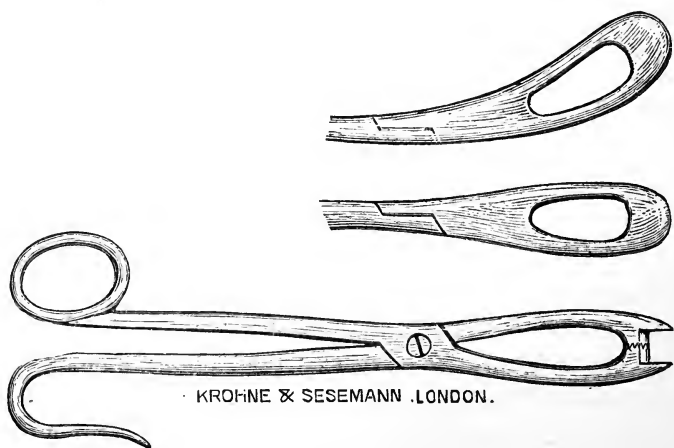


Fig. 115.

this object. It will be seen that they consist of an ordinary pair of bladder-forceps, with a free margin; by this contrivance it is almost impossible to do any damage to the wall of the bladder itself. The removal of the growth is effected partly

by twisting slowly with the hand, and partly by the crushing action of the jaws of the instrument. In the exploration of the pedicle, both before and after removal of the growth, I have found one of Marion Sim's enucleator hooks (Fig. 116) exceedingly useful. If, however, the connections of the tumour are extensive, and there is a doubt as to whether all can be got away without doing serious damage to the bladder itself, I feel sure that we had better content ourselves with the opening, which may under all circumstances be safely made, and the drainage that this opening with a suitable apparatus will provide. The lesser proceeding has in many instances proved the means of arresting hæmorrhage, and of adding materially to the comfort, as well as to the life, of the patient, even where it has been found impossible either to remove the tumour, or with safety to reduce its size.

And what applies to the male is equally applicable to the female, though with the latter, by reason of the anatomical differences in the parts, both exploration and removal can be more readily effected. Dr. Alexander, of Liverpool, was I believe one of the first in this country to demonstrate the successful removal of villous growths from the bladder under these circumstances.

It must not be overlooked that in some cases of malignant tumour of the bladder which have been operated upon, recurrence has taken place in the wound. Dr. J. H. Neale\* records an instance of adeno-encephaloid cancer of the bladder operated on by Mr. C. H. Marriott where the wound and perinæum adjoining were subsequently largely invaded with the growth. Mr. Marriott remarks:

"This case alone appears to me to put a limit to the range



Fig. 116.

\* *British Medical Journal*, May 21, 1887.

of surgical treatment of vesical tumours. Where a polypoid or pedunculated growth is diagnosed, by all means remove it; but in the case of a sessile tumour, closely incorporated with the muscular walls of the bladder, the treatment best suited to the requirements of the case seems to me to establish and maintain free drainage and so relieve the strangury, leaving the tumour to take its own course." In this expression of opinion most surgeons of experience I think will agree.

3. *The Destructive Stage.* The last phase of malignant growth within the bladder may be the inclusion of other parts such as the intestines and the formation of a fistulous communication between these two cavities. The symptoms attending such a termination are generally of a most distressing nature, due to the intermixture of fæces and urine in one common cloaca.

Though colotomy cannot be performed for malignant perforations with the hope of obtaining a permanent cure, it is often to be recommended as a safe means of arresting pain and prolonging life. It proved so in the following case, which some of you had an opportunity of watching. In this instance, however, the disease appears to have commenced in the rectum and spread to the bowel.

J. R., aged fifty-three, was admitted into No. 1 ward on October 9th, 1877, suffering from a malignant recto-vesical fistula. He was in a very miserable and reduced condition. Within the rectum was a scirrhus ulceration, which communicated with the bladder by means of an opening through which a large-sized bougie could be passed. On introducing a catheter into the bladder there was first an escape of foetid flatus, followed by urine containing fæces. The patient was suffering severe pain, much of which was due to the frequent distension of the bladder with flatus. Frequent washing out of the bladder and rectum, together with anodyne applications, failed to give any permanent relief. I opened the left colon, and established an artificial anus. The relief that followed this was most marked, all the more distressing symptoms disappearing. For some time the patient improved; death took place from exhaustion on Dec. 1, 1877. *Post-*

*mortem* examination shewed extensive ulceration between the rectum and bladder.

The operation entirely fulfilled my expectations—that is to say, it prolonged life and mitigated pain. My only regret was that it had not been performed at an earlier date; much suffering would in this way have been prevented, and I have very little doubt that it would have resulted in the comfortable protraction of the patient's life.

The functions of the bladder may be seriously interfered with by the growth of tumours having origin in other organs or parts, such as the uterus and ovaries in the female, and in the contents of the pelvis generally, including growths springing from the pelvic bone. For information relating to these, reference must be made to the treatises dealing with these parts, under which they can be more conveniently described.

The following case of recurring central enchondroma of the left pubic bone pressing upon the prostate and neck of the bladder, which formed material for demonstration in connection with this subject, and was subsequently operated upon by me, is, I think, from its rarity, deserving of a notice in this place.

D. R., a man aged thirty-five, came under my notice in December, 1885, when I removed an enchondroma, about the size of a walnut, from the pubic bone. It did not then cause him any inconvenience, but, as it was slowly growing, it was thought better to extirpate it. A recurrence seems shortly afterwards to have taken place, and a little over a year afterwards he again presented himself with a similar growth, but of greater extent. The outline of the growth is shown in the figure (Fig. 117), which was made for me by Dr. Fox Parry. The tumour, by encroaching on the neck of the bladder, was commencing to interfere with the act of micturition. On January 9, 1886, the growth was again removed by enucleation, and the cavity sponged out with a strong solution of chloride of zinc. The patient made a good recovery. He was seen six months after he left the Infirmary, and, though the pelvic bone was much thicker than natural, the growth of the tumour had been arrested by what had been done, if not permanently checked.

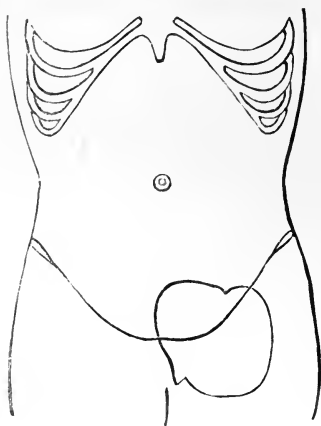


Fig. 117.

After what has been already said in connection with the subject of prostatotomy and prostatectomy (Lecture XXVIII.) for the removal of innocent and malignant growths, I do not think it will be necessary to make any further reference to the operative treatment of tumours of the prostate. Most of these are inseparably connected with the bladder, and but little can be done by operation. When the catheter fails to relieve pain, and the distress which the retention of urine and blood clots is capable of causing, the propriety of perineal incision for drainage, exploration, and, if found feasible, extirpation of the part, may then be considered, as I have already illustrated.

Before concluding let me briefly refer to an acute affection of the bladder, which should have been previously noticed, as the disease has no relation with that form of tissue destruction which has its origin in malignancy. I allude to that rapid disorganisation of the bladder which is occasionally seen in association with disease of the spinal cord, and is probably dependent, as Charcot\* suggests, upon irritation of certain parts of the spinal cord, and more particularly the grey matter. I am

\* "Diseases of the Nervous System," by Dr. J. M. Charcot, *New Sydenham Society*, 1877.

indebted to Dr. Glynn for the particulars of the following case which I had an opportunity of seeing with him in the Royal Infirmary.

T. R., aged 21, a porter, had previous to his present illness enjoyed good health. There was no history of syphilis. Two days before his admission to the Infirmary, when at work, he was seized with pain in the bowels. He walked home, took a dose of castor-oil, and applied a mustard poultice to the abdomen. In the night he tried to get up, and found that one leg was useless and numb. In the morning both legs were numb and absolutely powerless, and he was unable to pass his water. When brought to the hospital it was found that there was complete loss of power and sensation in the lower extremities. The urine had to be drawn off, and was found to contain pus and mucus. It was alkaline, and in the course of two or three days large quantities of blood were found mixed with it. Extensive sloughing of the bladder followed, and for some time before death all the urine was passed by the rectum.

On *post-mortem* examination, the spinal cord in the lower dorsal region was found softened. On section the distinction between grey and white matter was ill-defined. Under the microscope the large cells in the grey matter were much altered in shape, and dilated vessels and leucocytes were observed in large numbers. The coats of the bladder had sloughed, and abscesses had formed around it, through one of which a communication was established with the rectum.

It seems hardly possible, as Charcot urges, that such acute changes as these could be induced by the mere contact of urine, however decomposed, or by the introduction from without of any septic material by catheters. The rapidity of the symptoms, in the few instances of this condition I have seen, rendered all local treatment, beyond the use of the catheter, practically abortive.



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